26/2/26

Vol. XXIV. Part 2.

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The Journal of the Department of Agriculture of Victoria, Australia.

February, 1926.

PRINCIPAL CONTENTS

Gypsum or Copi

Plum and Prune Culture

Crop Competitions

The Export of Fresh Grapes

Caponizing of Cockerels

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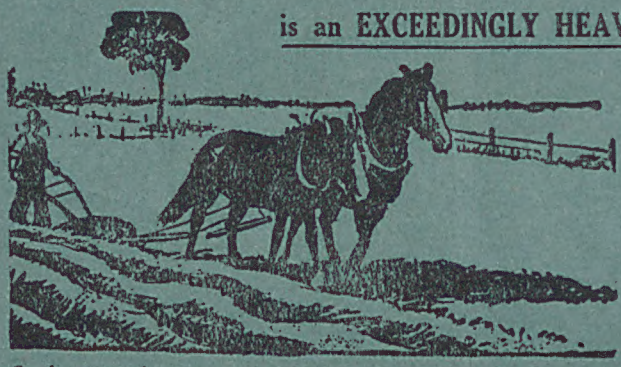

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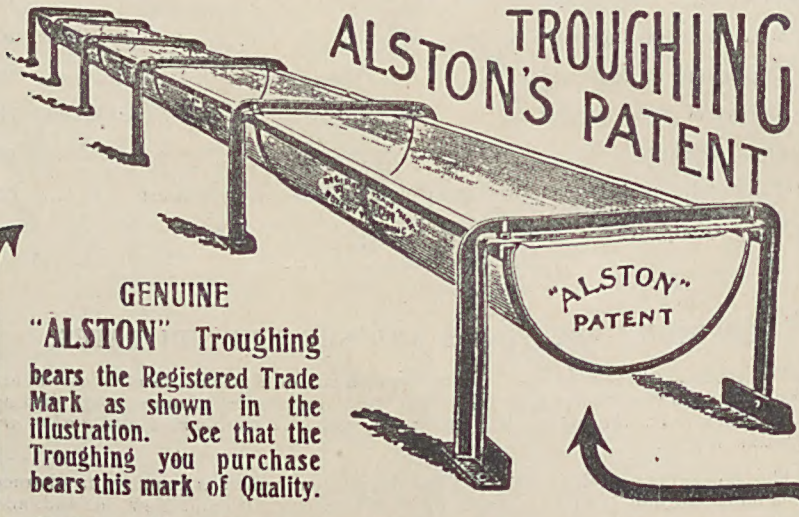

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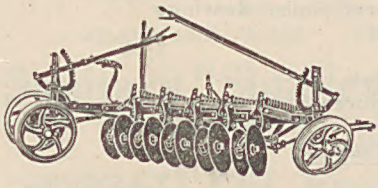

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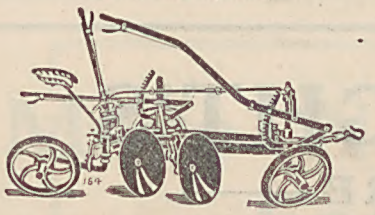

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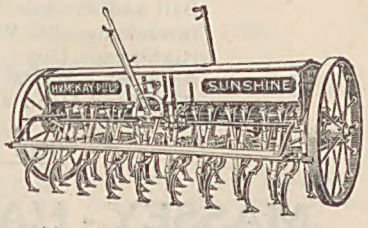

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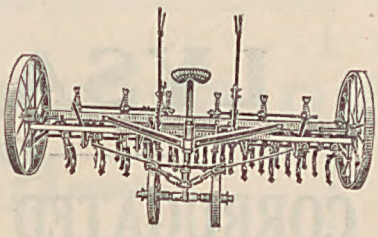

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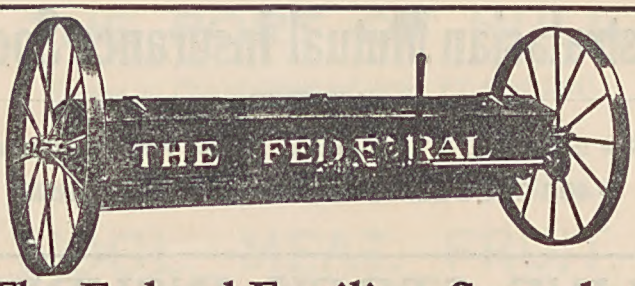

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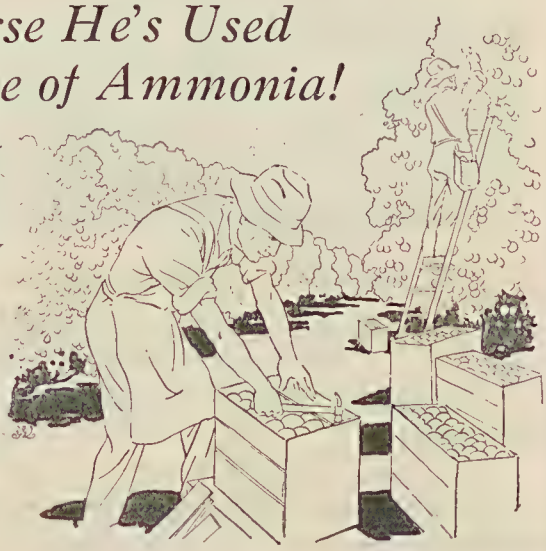

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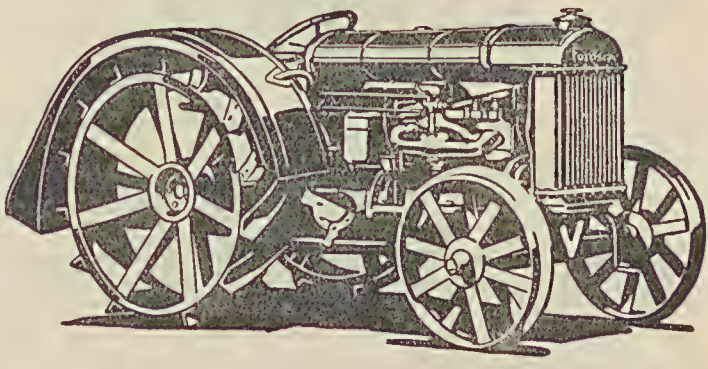

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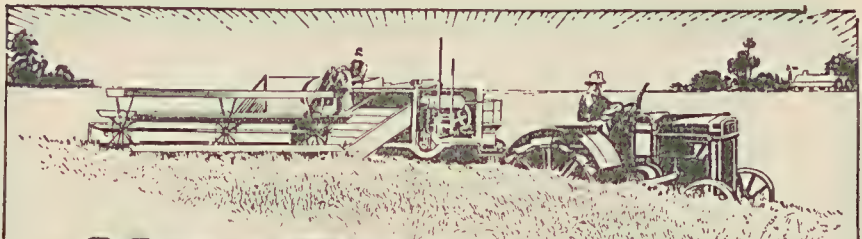

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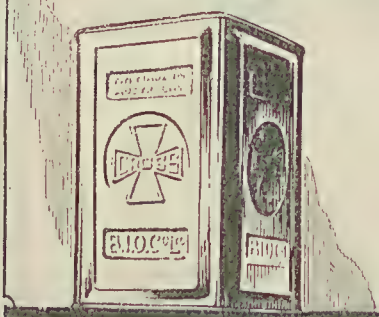

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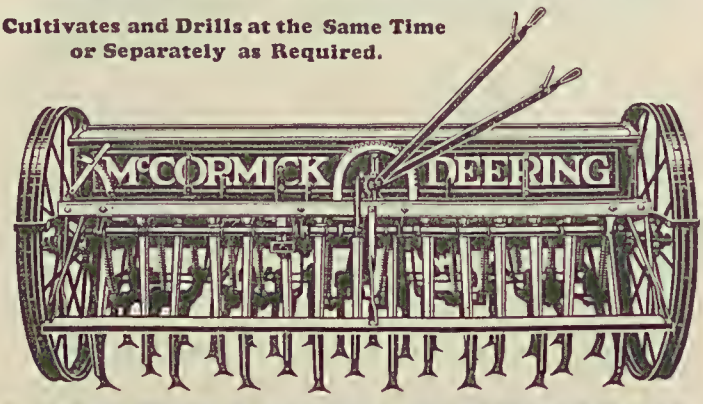

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Vol. XXIV. February, 1926. Part 2.

NATIONAL MUSEUM OF MELBOURNE

GYPSUM OR COPI.

By P. Rankin Scott, Chemist for Agriculture, and W. C. Robertson, Supervising Analyst.

Gypsum is a common mineral composed of hydrated calcium sulphate, i.e., it is a combination of lime and sulphuric acid; its formula is written thus—$CaSO_4$ $2H_2O$. It crystallizes in the mono-clinic system, which is a distinctive feature, the crystallization being perfect. It is its crystalline system and its softness (it is next to talc (soapstone) in the scale of hardness, and may be readily scratched with the fingernail) that distinguish it from calcite and rock salt. From the stand-point of agriculture, gypsum may be regarded as a substance containing lime and sulphur, not as such, but held in rigid combination. It is slightly soluble in water, one part dissolving in approximately 500 parts of water at N.T.P. (This is equivalent to 1 lb. of gypsum in 50 gallons of water.)

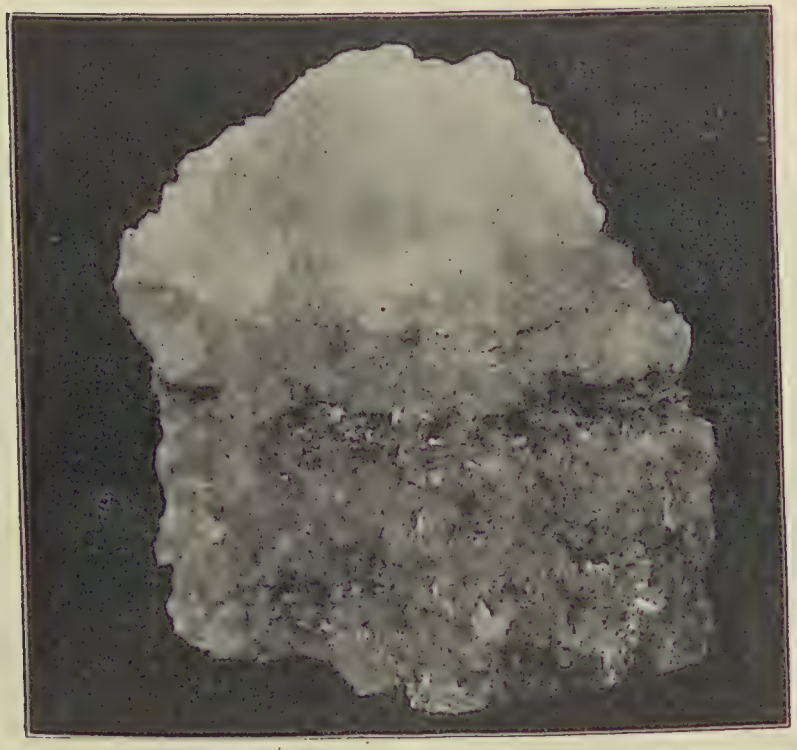
Assuming 100 per cent. efficiency, every inch of rain dissolves three-fourths of a hundredweight of gypsum per acre, so that a 1-ton dressing on a soil subjected to a 12-in. rainfall would be wholly dissolved or melted in the course of approximately two years.

It is worthy of note that in the presence of soluble salts (excepting common salt) and lime, the solubility of gypsum decreases with the saturation of the solution until a point is reached when the gypsum is no longer dissolved. Solutions of common salt (NaCL) increase the solubility.

The name "Selenite" is sometimes applied to the clear crystals (see illustration on page 66), "Satin Spar" to the fine fibrous variety, and "Alabaster" to the compact marble-like variety. The two former varieties are of common occurrence in the north-western districts of Victoria.

Locally, and in the trade, gypsum is the term applied to the clear clean crystals; "Copi" or "Flowery Gypsum" denotes the soft, very fine, light powdery deposits, whilst mixed samples are sold under the name "Seed Gypsum." In other countries "Refuse Gypsum," natural or artificial, is commonly known as "Land Plaster."

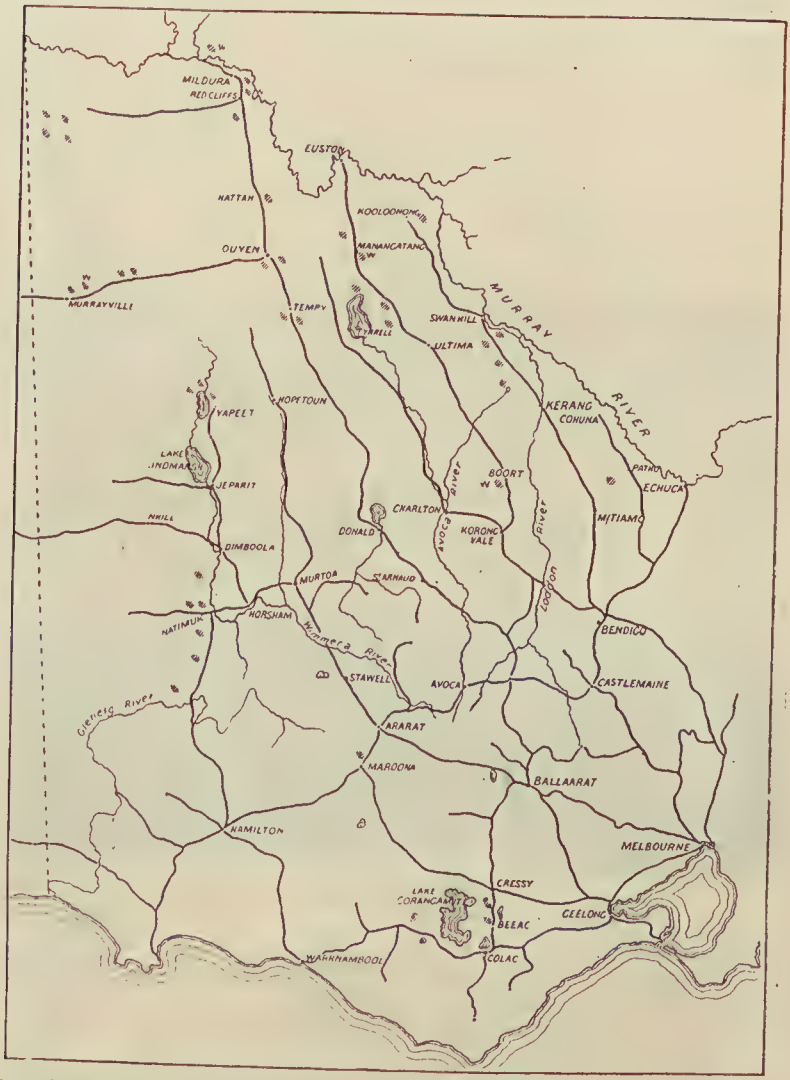
Characteristic Crystals of Selenite (Gypsum).



Salt and Gypsum Crystals.

Gypsum deposits vary in colour from white, grey-white, yellow-white, to light-red. For agricultural purposes the colour does not matter, for it is mostly due to some very slight impurity. What does matter is its physical condition.

"Flowery Gypsum," whilst giving the necessary "spread" and intimate contact, will "blow" in windy weather. The heavier and denser "Seed Gypsum" does not "blow" to the same extent, and is therefore very often preferred.



Map of Western Victoria showing places where there are known Gypsum Deposits.

The deposits are marked by shaded spots; those that are being worked are indicated by the letter W.

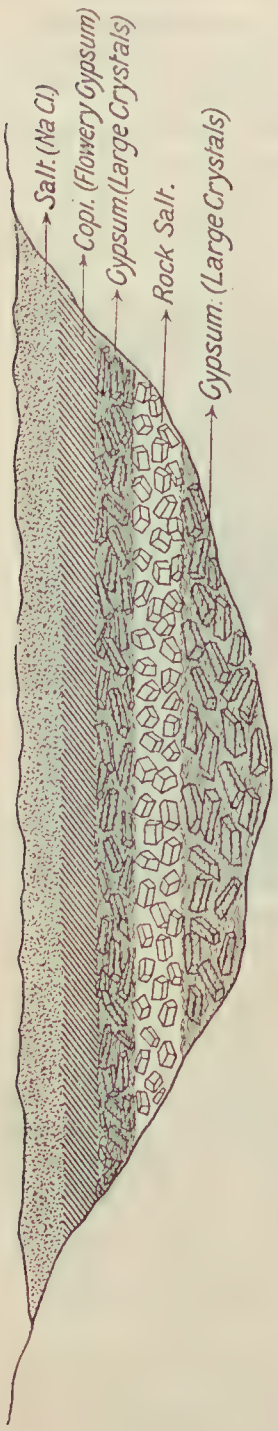
Enormous deposits of gypsum, or copi, exist in Victoria. The map on this page denotes the main deposits already located, and will serve to show how common is the occurrence of the mineral in the district known as the Mallee.

It must not be assumed that all the deposits located, and indicated by shading on the map, are commercial propositions under existing conditions, but it may be safely said that many millions of tons of good quality gypsum await exploitation in these Mallee deposits, and that just as many tons whose location is unknown to-day will ere long be discovered and worked. In the case of many deposits, unfortunately, the problem of transportation enters into the question and precludes economical working. The deposit which was first operated and developed on a commercial scale in Victoria exists at Boort, on the fringe of the Mallee country, on the railway line running from Bendigo through Korong Vale to Manangatang. It is in the bed of a dry lake or lagoon adjoining the township and railway station, and is therefore admirably situated for economic working. Probably the

View of a Large Gypsum Deposit at Cowangie.

only disadvantage of its situation is its low-lying position, which precludes operations during the winter months. This deposit has been worked for more than 25 years, and is still yielding gypsum of good quality.

Other fields in active commission exist at Tempy (on the Mildura line), Red Cliffs (near Mildura and almost on the urray), Manangatang, and Cowangie. All these deposits are adjacent to rail or water ways—the key to the position in the gypsum trade—for, with road costs, in addition to "garnering" and handling charges, and (in bulk handling) losses in transit, plus freight, the price per ton can easily reach a figure which will prohibit the use of gypsum on the farm. The deposits being worked at the places named are superficial, and no overburden exists.



Section of a Gypsum Deposit.

Deposits of gypsum are the result of double decomposition between sulhpuris acid (formed by the natural oxidation of iron pyrites ending in the formation of sulphate of iron) in the form of soluble sulphate with calcium carbonate (lime stone or chalk), whereby gypsum and iron oxide (ochre) are formed, the latter being due to the decomposition of the unstable carbonate of iron.

Over a period the gypsum is leached out of the soil. The amount dissolving is increasing in a salty area, and the solution draining to the lower levels finally collects as an inland lake or lagoon. Subsequent summer evaporation (especially in drought years) dries the lake, and during the period of concentration by evaporation gypsum crystallizes and is deposited—during slow concentration, i.e., in the early stages of the process, as the large clear crystals of selenite (gypsum) (see illustration on page 66), and finally, during the rapid end concentration, as the smaller crystals (Satin Spar or Copi). Common salt (NaCL) being more soluble, crystallizes during the last stages, and is often to be found on the surface.

The cycle of deposition is repeated again and again, each subsequent flooding re-dissolving gypsum and common salt. The solution drains to the swamp or lagoon where the whole of the top layer of salt and a goodly proportion of the gypsum re-dissolves to be re-deposited during the next hot dry season.

The subsequent evaporation with maybe a change in the climate, or possibly the geographical formation, resulted in a deposit containing a surface layer of common salt (NaCL) of varying depth resting on alterate layers of copi ("Flowery Gypsum") and gypsum (the larger clear crystals) to the lake bottom. Bands of cubical crystals of rock salt are very often found between the layers of the lower portion of the deposits. The illustration on this page depicts a section of a Mallee gypsum deposit.

While the lake or lagoon deposits are the only ones exploited or of importance, beds of gypsum with a foot or two of overburden are common throughout the Mallee. The quality of the deposits as regards gypsum content are shown by the following table.

Of 56 samples collected from the deposits denoted by shading on the map (see page 67), the following returns were obtained:—

Deposit at—	Gypsum ($CaSO_4 2HO_2$) Per. cent.
Waitchie	68-90
Myall	85-94
Nowingie	61-89
Chillingollah	92-96
Sea Lake	81
Cow Plains	93.7
Cowangie	73-99
Piangil	81.7
Manangatang	94.6
Bolton	76.8-92.7
Bronzewing	86.3
Galah	95.2
Lake Boga	91.5
Kunat-Kunat	83.5-89
Harrow	99.6*
Tempy	49.8
Linga	69.2

* Probably a crystal.

Of the 56 samples analyzed, 41 contained over 80 per cent. gypsum, and 30 contained over 90 per cent. of the mineral.

It will be noted from the figures cited that the quality of the deposits vary, not only between deposit and deposit, but between the deposits themselves.

Commercial Uses of Gypsum.

Gypsum is largely used in the manufacture of Plaster of Paris. The mineral, which must be of a high degree of purity, the heavy dense crystals being usually selected, is heated in a specially constructed kiln to the "fritting" temperature (110-120 deg. C.), after which the kiln is allowed to cool and the contents discharged and ground in a pulverizing mill to a fine powder, which is bagged and sold as plaster of paris.

Gypsum is also used in the manufacture of cement, in the admixture of artificial fertilizers, as an adulterant in paints, as a loading in paper manufacture, and to a lesser extent in many classes of fancy goods.

In England and on the Continent its use is fairly general as a soil ameliorant; particularly is this so in the vineyards of France. For over a score of years gypsum has been tried here and there in Victoria as a soil ameliorant, but its use has not become general.

The explanation of this is two-fold—firstly, its comparatively high cost; and secondly, the slow action of the mineral. The first drawback is due to high wages, transport costs, and overhead expenses, coupled with the small output. The second, to large holdings in a new country of small population with but a small percentage of land under intense culture, together with the tendency in the mind of the farmer to compare its results with those from dressings of "super." These factors all help to push gypsum into the background in favour of fertilizers which will give better financial results.

View showing the peculiar "Mound Formation" of some Gypsum Deposits, said to be due to "a blow."

Effect of Gypsum on the Soil.

The effects of gypsum when applied to soils are varied. On some the result is remarkable, on others hardly noticeable. A lot will depend on the constitution of the land.

The action of the mineral when utilized as a soil dressing may be regarded as inconstant, and will depend upon (*a*) the soil type, (*b*) the variety of crop, (*c*) the climate and rainfall, but even then the effect is subject to manifold limitations.

It is generally conceded that gypsum—

(1) liberates potash from minerals containing potash (such as felspar, mica, &c.) by a process of displacement, the base (lime) of the gypsum displacing the base (potash) of the soil mineral, whereby potash sulphate goes into solution in the soil water.

(2) To a lesser extent phosphoric acid, magnesia, and silica are also liberated and rendered available.

This is confirmed by the results obtained by Boussingault in experiments with clover grown on treated and untreated soils.

Table Showing Analysis of Clover Grown on Soils Treated with Gypsum and on Soils Untreated.

Clover Crops contained Per Acre—	1st Year.		2nd Year.	
	Gypsum.	No Gypsum.	Gypsum.	No Gypsum.
Silica	11·3	9·2	42·1	5·1
Oxides of Iron and aluminium ..	1·1	·56	..	·2
Lime	32·1	13·0	41·6	13·0
Magnesia	7·3	3·5	11·1	2·8
Potash	38·7	10·8	39·3	11·5
Soda	·9	1·56	·03	1·1
Sulphuric Acid (SO_3)	3·7	1·7	3·6	1·2
Phosphoric Acid	9·7	4·4	9·2	2·8
Chlorine	4·1	1·8	3·4	1·2

(3) It encourages the growth of legumes, such as clover, trefoil, and the like, thereby indirectly replenishing the nitrogen content of the soil.

(4) Although it should be regarded as an excitant rather than a manure, yet, where there is a deficiency, it would supply both lime and sulphur to the plant.

(5) It increases the rate of ammonification, hence has some effect on green manuring.

(6) It flocculates the finer particles in soils, and this physical property enables it to have a beneficial effect on certain types of soils in breaking them down, thereby preventing cementation (setting) and increasing or enhancing mellowness.

In all the foregoing it should be noted that the effects are produced in conjunction with water.

In conclusion and in reference to (6), the flocculating effect, the following experiment with three distinct types of soils, viz.,

(*a*) a light grey silicious silt used for horticulture;
(*b*) a calcareous fine red sand used for cereal culture;
(*c*) a heavy black organic clay used for onion growing;

will serve to illustrate the effect of gypsum on soil colloids, and also will show the effect of other substances commonly used on soils.

The mode of procedure was to treat separate portions of 200 grms. of each soil with—

(1) nothing;
(2) 20 parts of lime;
(3) 20 parts of superphosphate;
(4) 20 parts of gypsum;
(5) 20 parts of sulphate of potash;
(6) 20 parts of sulphate of ammonia;
(7) 20 parts of mono-ammonium phosphate;

(Each bottle contains 200 grms. of silicious silt in 2,000 parts water.)

Experiments with Silicious Silt—Soil (a)

(Each bottle contains 200 grms. of sand in 2,000 parts water.)

Experiments with Calcareous Fine Red Sand—Soil (b).

Untreated. Soil treated with lime. Soil treated with super. Soil treated with gypsum. Soil treated with sulphate of potash. Soil treated with sulphate of ammonia. Soil treated with mono-ammonium phosphote.

(Each bottle contains 200 grms. of clay in 2,000 parts water.)

Experiments with Heavy Black Organic Clay—Soil (c).

and then transfer the several samples of soil, with the addition of 2,000 parts of water, to Winchester bottles. For the experiment, three sets of seven bottles each were required. Each bottle was then thoroughly agitated for five minutes and allowed to settle for twenty minutes, when the photograph reproduced on pages 72 and 73 was taken. This shows both the flocculating effect and the variation in the effect. Not only is the effect varying in the case of gypsum, but the variation is just as marked in the case of all the other substances excepting the mono-ammonium phosphate.

The experiment discloses that the greatest flocculating effect took place on the heavy black organic soil (*c*), which contained colloids of organic and volcanic origin, while there was less activity in the silicious silt (*a*), containing colloids consisting almost entirely of the finest particles of silica. The minimum flocculation occurred on the calcareous soil (*b*); this may be explained by the decrease in the gypsum dissolved, due to the calcium carbonate of the soil.

The illustration indicates—

(1) that the action of gypsum will vary with the soil;
(2) that manures such as "super.," sulphate of ammonia, &c., have a similar flocculating effect; and,
(3) that in all these cases there is a difference, tending to show that where the same type of soil is tried in connexion with different substances, or where the same substance is tried on different soils, a varying efficiency results.
(4) that the flocculating efficiency of lime on the soils (*a*) and (*b*) is much more pronounced than it is in the case of soil (*c*).

PLUM AND PRUNE CULTURE.

By J. M. Ward, Superintendent of Horticulture.

(Continued from page 746, Vol. XXIII.)

Varieties to Plant—*continued.*

European Type (*Prunus domestica*).

Angelina Burdett.—A well-known variety, ripening during the first and second weeks of January, or later, according to situation. The tree is vigorous, hardy, and very productive if planted with a variety

Fig. 29.—Branch of Angelina Burdett showing Effect of Cross-fertilization with Black Diamond.

that blossoms at the same period. Without cross-pollination this variety is usually a shy bearer. See Fig. 29. Fruit of medium size, roundish, deep suture, one side often larger than the other; skin, dark-purple with brown dots, covered with heavy bloom. This plum is a very good one for culinary purposes and for dessert, and is also considered suitable for drying purposes.

Bavay (Reine Claude de Bavay).—This is one of the best of the greengages. The tree is a heavy bearer and of vigorous growth. Fruit

ripens from beginning to about the middle of February, is of medium size, roundish oval, greenish yellow in colour, changing to dark straw-yellow, sometimes obscurely streaked and splashed, covered with thin bloom; flesh is rich golden-yellow, juicy, slightly fibrous, tender, sweet, and of pleasant flavour. Can be highly recommended for planting.

Brahy's Greengage.—This is a greengage which is supposed to have been raised near Liege, Belgium. The tree is a strong grower and a fair to good cropper; fruit very large for a gage and round; flesh, rich yellow, juicy and rich in flavour; skin, yellowish-green, having a fine bloom; ripens about first week in February, according to the district in which it is grown.

Cherry Plum.—Owing to very early blooming it is subject to injury by frosts, and is therefore not suitable for cold late districts. As most people know, it makes a particularly strong growth, and is often planted for breakwinds, and seldom, if ever, in orchard rows. The fruit is excellent for jam and other culinary purposes, and on account of its earliness there is always a ready market for the fruit, which, as the name denotes, is small. This variety is so common that further description is unnecessary.

Coe's Golden Drop.—This variety also hardly needs describing, as it is so well known. The tree is a strong grower, but is often looked upon as a shy bearer. The writer was a fairly large grower of this plum, and has proved it to be a good cropper every year, provided it is pruned on the correct system. If left unpruned, it becomes a particularly light bearer, for the simple reason that once the buds fruit and die out they are seldom replaced by new ones on the same wood, a few fruit spurs being the exception. The fruit is excellent for jam-making purposes and canning; it also dries well. It ripens about the third week in February, and is easier and quicker to pick than most varieties. It is from 1½ inches to 2 inches in length, oval shape, tapering at the base to a short neck; colour, golden-yellow, occasionally with a faint bronze blush, showing greenish streaks and splashes before full maturity, overspread with thin bloom; flesh juicy, intermediate in firmness and tenderness, rather sweet when ripe, with mild pleasant flavour. This variety is a good one to grow. It should be interplanted with greengage, Grand Duke, or other plums which flower at the same period.

Coe's Late Red.—This is often called Sydney Late. The tree is a fairly vigorous grower, and hardy. It is a good cropper, though to attain the best results this variety should be planted in a moist situation, but where the water does not lie stagnant. The fruit is of medium size, roundish in shape; purplish-red in colour with thin blue bloom; flesh yellow with vinous flavour. The fruit is produced on young and old wood, and does not ripen until about the middle of April. The tree is apt to form many fruit spurs, which will continue to bear for a number of years. The fruit keeps and ships well, and owing to its lateness in ripening often realizes good prices.

d'Agen.—There is some controversy in the different States as to which is the true d'Agen. There is certainly a number of varieties grown in South Australia, Victoria, and New South Wales, all known

as d'Agen, some of which are totally different from the one produced in such great quantities in Santa Clara Valley, California, whilst others resemble it in every way. Some growers refer to it as the "French Prune", others state that "French Prune" is a different variety from d'Agen. In South Australia there are two distinct kinds —one called d'Agen, and the other French Prune. The latter is really the one known as d'Agen in California, but there it is also called

[From "The Plums of New York."—Hedrick.

Fig. 30.—Prune d'Agen as grown in California, U.S.A., and at Ardmona, Vic.

"French Prune" (Fig. 30). In his book, *The Plums of New York*, Professor U. P. Hedrick, in referring to d'Agen, states:—

> "Agen is the plum par excellence for prune-making in France and America. Several qualities make it admirably fit for curing into prunes. To begin with, it has a high percentage of sugars and solids so that the plum cures readily into a firm, sweet, long-keeping prune, which in cooking needs comparatively little sugar; again, the trees bear regularly, abundantly, and the plums are uniform in size—productiveness, regular

bearing, and uniformity of size of fruit being necessary attributes of a good prune-making plum; lastly, it hangs well on the tree as it ripens and afterwards, so that the curing really begins on the tree. Besides making most excellent prunes, the Agen is a very good dessert plum—one of the best—and ought to be in every home orchard and, where it attains sufficient size, in every commercial plantation. Lack of size is the defect in this variety which has kept it from being more largely grown

Fig. 31.—Black Diamond adjoining Angelina Burdett, and showing Heavy Crop as the Result of Cross-fertilization.

outside of prune-making regions. If by pruning, thinning, and other cultural treatment the size of the plums could be increased, the Agen should prove a valuable commercial fruit in New York.

The name of this variety is derived from Agen, a region in France where it is extensively grown. Tradition says that on their return from the Crusades, the Benedictine monks brought with them from Turkey or Persia what was then known as the date plum, and planted it in the garden of their abbey

on the River Lot, in the vicinity of Bordeaux, France, and that afterwards this became the Agen. Its first recorded importation into the United States was made in 1854 by the United States Patent Office, though it was described by Prince as early as 1832. The most important introduction was made, however, in 1856, when Louis Pellier, of San Jose, California, introduced Agen on the Pacific Coast, when it soon became and still is the leading plum, though with curious persistency the fruit-growers there call it the "French Prune" and the "Petite Prune." In 1862 this variety was added to the fruit catalogue list of the

Fig. 32.—Black Diamond, adjoining Jefferson, with which it has been Pollinized.

American Pomological Society. There are many strains of Agen in America, due to the numerous importations of grafts from various parts of France, where the plum orchards are frequently grown from seedlings or from sprouts; some of these strains are worthy of varietal recognition.

Tree of medium size, upright-spreading, dense topped, hardy, very productive; branches ash-gray, smooth, with numerous large raised lenticels; branchlets slender, short, with short internodes, greenish-red changing to dark brownish-drab, dull, pubescent, with small lenticels; leaf-buds of medium size and length, conical, free.

Leaves folded upward, obvate or oval, one and three-quarters inches wide, three and one-quarter inches long, velvety; upper surface with few fine hairs and a narrow, grooved midrib; lower surface pale green, thickly pubescent; apex abruptly pointed, base acute, margin doubly serrate; petiole 1 inch long, slender, pubescent, tinged red, with two or three small, globuse, greenish-brown glands usually on the stalk.

Fig. 33.—Grand Duke.

Season of bloom intermediate in time and length; flowers appearing after the leaves, 1⅛ inches across, white; borne on lateral spurs, singly or in pairs; pedicels ⅝ inch long; thick, glabrous, except for a few short hairs, greenish; calyx-tube green, campanulate, pubescent; calyx-lobes obtuse, somewhat pubescent within, with glandular margin, reflexed; petels broadly oval or obvate, entire, tapering to short, broad claws; anthers yellowish; filaments 5-16 inch long; pistil glabrous, equal to the stamens in length.

Fruit late, season short; 1½ inches by 1⅛ inches in size, obvate, the base necked, halves equal, cavity shallow, narrow, flaring; suture very shallow, indistinct; apex roundish or flattened; colour reddish or violet-purple, overspread with thin bloom; dots numerous, small, brown, obscure, clustered about the apex and interspersed between russet flecks; stem thick, ⅜ inch long, glabrous, adhering well to the fruit; skin thin, tough, flesh greenish-yellow, tender, sweet, aromatic; very good to best; stone

Fig. 34.—Jefferson, adjoining Diamond, showing effect of Interpollination.

semi-free or free, ⅜ inch by ½ inch in size, oval, flattened with pitted surfaces, rather abrupt at the base and apex; ventral suture somewhat narrow, furrowed, with distinct wing; dorsal suture widely grooved."

Diamond (*Black Diamond*).—Fruit fairly large (according to crop), handsome, a little sour, but its tartness is something in its favour. Colour, deep reddish-purple changing to dark purplish-black when mature, with thick bloom; small numerous russet dots; flesh, pale or golden yellow, sometimes with a faint red tinge next the skin; not juicy and not good flavour. For jam-making purposes the fruit should be left upon the tree until fully mature. Tree yields heavy crops, of vigorous upright spreading growth. (See Figs. 31 and 32).

Giant.—A large prune of fairly good quality, but not so good as its parent d'Agen, of which it is a seedling. It is a first-rate shipper. The tree is usually fairly productive. The fruit ripens about the middle of February. In size it is about 2 inches by 1½ inches. Colour, light to dark purplish-red, overspread with bloom of medium thickness;

[From "The Plums of New York."—Hedrick.

Fig. 35.—Pond's.

flesh light golden yellow, variable in juiciness, coarse, somewhat fibrous, firm, rather sweet. For drying purposes it is not so good as either d'Agen or Italian, but like most prunes is very good for jam-making; the fruit, however, should be ripe to obtain the best results.

Grand Duke (Fig. 33).—This is a very fine plum in all respects. It was raised in England by Thomas Rivers from a seed of Autumn Compote. It was distributed about the year 1876, but it was not grown very much here until quite recently. As far as can be seen this plum is most suitable for Tasmania. The tree is very hardy, a strong, healthy grower, and very productive. The fruit ripens from about the

ERRATA.

The titles of Figures 35 and 36 have been misplaced. The title of Figure 35 should be President and that of Figure 36 Pond's.

This misplacement of titles has caused an error on page 84 and "Pond's (Fig. 35)" on the fifteenth line from the bottom should read "Pond's (Fig. 36)".

third week to the end of February; it is oval in shape, and about 2 inches or more in length; it keeps and ships well. The flesh is golden-yellow, juicy, firm, sweet, and good in flavour. The skin is reddish-purple or purplish-black, overspread with a thick bloom. This variety is recommended for planting with Golden Drop for pollinating purposes.

Fig. 36.—President.

Green Gage.—There are several varieties of Green Gages, all of which do well in Tasmania, but as already stated, Reine Claude de Bavay is about the best of these.

Imperatice.—This is an old variety and well known in Europe. It is the plum known as "Jones' Favorite" in H. Jones and Co.'s I.X.L. jam trade. The tree is vigorous, and very productive. The fruit is of

medium size, keeps well, is roundish in shape, purplish-black in colour, the flesh being golden yellow, rather dry, but sweet and of good quality. It is essentially a jam-making plum, but it should be very ripe for this purpose, and therefore must not be picked too soon.

Italian.—This is a prune which does well in this State, and one well worth growing. It is an excellent one for drying in the evaporating factories. Large quantities are grown and used for the purpose near Salem, Oregon, U.S.A.; in fact, Italian is the leading prune in Oregon, where the writer inspected thousands of acres of them during the picking season. It is also first class for jam-making, dessert, &c. The tree, while not being a strong grower, is, nevertheless, a healthy and productive one, but requires either irrigation or a moist situation, otherwise, as far as the writer has been able to judge, it is not very fruitful. The fruit is oval in shape, and about 2 inches in length; colour purplish-black, overspread with very thick bloom; flesh greenish-yellow changing to yellow, juicy, firm, sub-acid, quality very good. It ripens about the end of February.

Jefferson.—This variety was raised in America about the year 1825. The tree grows fairly upright, is vigorous, and a heavy cropper. The frut is of medium size, ripening from the first to second week in February; colour greenish-yellow, changing to bronze-yellow, sometimes with faint pink blush on the exposed cheek, often indistinctly streaked and mottled with green before maturing. The flesh is deep yellow, juicy, sweet, and pleasant to the taste, and of good quality. Owing to its productiveness and suitability, this is a variety that can be well recommended for planting. (See Fig. 34.)

Monarch.—Although this plum is not very much grown here, it promises very well, and is popular wherever tried. Like Grand Duke, Monarch is also a seedling of Autumn Compote, and was introduced by the originator (Thomas Rivers) in 1885. The tree is of medium size and vigour, and very productive. The fruit ripens about the same time as Grand Duke, is roundish-oval in shape, and large in size; colour dark purplish-red, overspread with thick bloom; flesh golden-yellow, juicy, somewhat fibrous, sweet next to the skin, a little tart towards the stone, a good keeper, and useful for almost any purpose. It is well worth growing.

Pond's (Fig. 35.)—A variety favoured by some who cater for shop trade, for, as Hedrick says, "The eye is pleased with Pond's, but," he adds, "the palate is sadly disappointed." It is not favoured by the jam factories, but is a good kind for shipping and shop trade. The fruit ripens about the middle to the third week in February, and sometimes later. The colour varies from reddish-purple to purplish-red, overspread with thick bloom. The flesh is an attractive golden yellow, not very juicy, fibrous, not highly flavoured.

President.—This variety is being much favoured by many Victorian growers, and some prefer it to Grand Duke, which is a more prolific grower than President. The fruit is medium to large in size; colour dark purple; flesh golden yellow, of good eating quality and texture. Ripens about the same time as Grand Duke. It is a very good shipper. The tree bears regular crops. It can be recommended for commercial planting.

Blooming Times of European Plums (*Prunus Domestica*).

Variety.	Districts and Localities.									
	Metropolitan.	South Eastern.	Goulburn Valley.	North Eastern.	Northern (including Mildura).	Burnley.			Bacchus Marsh.	
	1925.	1925.	1925.		1925.	1913.	1914.	1915.	1920.	1925.
Angelina	Sep. 10	..	Sep. 22	..	..	Sep. 4	Sep. 7	Aug. 24	Sep. 20	Sep. 20
Black Diamond	Sep. 12	Sep. 12	Sep. 23	..	Sep. 23	Sep. 4	Sep. 11	Sep. 2	Sep. 20	Sep. 20
Blue Belgium	Sep. 27	..	..	..	..	..	..	..	..	..
Cherry Plum	Sep. 3	Sep. 1	..	..	..	Sep. 5	..	..	..	..
Coe's Blue Superb	..	..	..	..	..	Sep. 10	Sep. 14	Sep. 8	..	..
Coe's Golden Drop	Oct. 3	Oct. 1	Oct. 3	..	Oct. 6	Sep. 23	..	..	..	..
Coe's Late Red	Sep. 22	Oct. 2	..	..	..	..	..	Sep. 5	..	..
Cole's Golden Gage	Sep. 30	Sep. 28	..	..	..	Sep. 18	Sep. 17	..	..	..
De Montford	Sep. 18	..	..	..	Oct. 3	Sep. 17	..	Sep. 14	..	..
Early Orleans	Sep. 22	Sep. 20	Sep. 25	..	Sep. 25	..	..	..	..	..
Grand Duke	Sep. 23	Sep. 20	Sep. 23	..	Oct. 4	Sep. 10	..	Sep. 15	Sep. 22	Sep. 22
Green Gage	Sep. 30	Sep. 30	Oct. 3	..	Oct. 7	..	..	..	Sep. 29	Oct. 5
Jefferson	Sep. 20	Sep. 20	Oct. 4	..	..	Sep. 10	..	..	Sep. 24	Sep. 24
Late Black Orleans	Sep. 18	..	..	..	..	Sep. 12	Sep. 11	..	..	..
Magnum Bonum	Sep. 28	Sep. 30	Oct. 3	..	Oct. 10	..	..	..	..	..
Pickering	Sep. 30	Sep. 30	..	..	..	Sep. 24	Sep. 23	Sep. 17	..	..
Pond's Seedling	Sep. 30	Sep. 30	..	..	..	..	..	..	Sep. 24	Sep. 24
President	Sep. 23	..	..	..	..	..	..	..	Sep. 22	Sep. 22
Prune d'Agen	Sep. 26	..	Oct. 2	Sep. 28	Oct. 4	Sep. 10	Sep. 11	Sep. 10	..	..
Prune Fellemberg	..	..	Oct. 8	..	Oct. 10	..	..	..	Oct. 9	Oct. 9
Prune, Sugar	..	..	Oct. 3	..	Sep. 26	Sep. 11	..	Sep. 4	Oct. 9	Oct. 9
Prune, Goulburn Valley	..	..	Oct. 6	..	..	..	..	..	..	..
Prune, Splendour	Sep. 25	..	Oct. 3	..	..	Sep. 15	..	Sep. 15	..	..
Prune, Giant	..	..	Oct. 4	..	..	Sep. 12	..	..	..	..
Prune, German	..	..	..	..	..	Sep. 15	..	..	..	..
Reine Claude de Bavay	Oct. 3	Sep. 25	..	..	..	Sep. 23	Sep. 14	..	..	..
Robe de Sargent	Sep. 29	..	..	Sep. 30	Sep. 30	Sep. 15	Sep. 4	..	..	..
Washington	Sep. 28	Sep. 29	..	..	..	..	..	..	..	..

Blooming Times of Japanese Plums (*Prunus Triflora*).

Variety.	Districts and Localities.							
	Metropolitan.	South Eastern.	Goulburn Valley.	Burnley.			Bacchus Marsh.	
	1925.	1925.	1925.	1913.	1914.	1915.	1920.	1925.
Apple Plum	..	..	Sep. 23	..	..	..	..	..
Ballena	Sep. 9	..	Sep. 10	..	..	..	..	..
Burbank	Sep. 12	..	Sep. 20	..	..	..	..	..
Climax	..	..	..	..	..	..	Sep. 20	Sep. 20
Formosa	Sep. 10	..	..	..	..	..	..	..
Gaviota	..	..	..	Sep. 10	Sep. 7	Sep. 17	Sep. 18	Sep. 18
Hermosillo	..	..	Sep. 21	Sep. 10	Sep. 7	Sep. 10	..	..
October Purple	Sep. 10	..	Sep. 19	Sep. 2	..	..	..	..
Santa Rosa	Sep. 9	Sep. 15	Sep. 11	Sep. 7	Sep. 4	Aug. 20	..	..
Satsuma	Sep. 11	Sep. 6	Sep. 12	Aug. 28	Aug. 26	Aug. 25	Sep. 5	Sep. 12
Wickson	Sep. 15	Sep. 9	Sep. 16	..	Sep. 4	Sep. 1	..	..

(To be continued.)

DONALD CROP COMPETITION, 1925.

Report of Judge, L. C. Bartels, B.Agr.Sc., Senior Irrigation Officer.

Donald wheat farmers must be reckoned amongst the best exponents of advanced methods, and the high yields obtained during the last few seasons bear eloquent testimony to the fact. But not till this year has there been a proper appreciation of the part played by good cultural methods in augmenting yields. Their influence has been to some extent hidden, because the indifferent farmer has been favoured by good seasonal conditions, and has managed to secure fair returns. The man who professes to doubt the wisdom of the new teachings will, however, find little evidence to support him this year; on the contrary, the fact that high yields will be obtained by many farmers is a triumph for the advocates of better farming.

There is ample evidence to show the value of early fallowing and the maintenance of fallows in proper condition, free from weeds, with the surface mulched to prevent as far as possible the evaporation of moisture from the subsoil.

Good rains fell during the spring and early summer in 1924, and so some well-tilled winter fallows have given good crops. The absence of favorable spring rains this season has, of course, adversely affected the development of the wheat. At Mr. D. Wells's farm at Swanwater West, only 486 points of rain had been recorded from the time of sowing to the time of inspection on 18th November. This was distributed as follows:—June, 78 points; July, 140 points; August, 65 points; September, 176 points; October, 22 points; November, 25 points. This crop was finishing well, and would benefit by rain which fell subsequently.

Mr. L. Wells's crop was green, and would be well favoured by the November rains. On the whole, the crops were no further advanced than they were at the same time last year.

A notable feature about the winning crop was the heavy application of super. made; 170 lb. per acre was drilled in. This is equivalent to 208 lb. of the old 18 per cent. super., and is the highest rate of manuring recorded in these Donald competitions. The wheat was well headed and was finishing well. A strip of the crop which had been sown twice, and so had received a double application of the manure, was superior to the rest. This is not quoted to encourage farmers to be too lavish with manure, but as an illustration to show that little attention need be paid to those who say that manure "burns" the crop. Provided that the crop is sown on well worked fallow, there is little danger on that score. Phosphoric acid is only one of the elements of plant food, and unless other necessary materials are present in the soil in adequate proportions, the full value of liberal phosphatic manure dressings is not obtained. Particularly does this refer to

nitrates, the production of which is promoted by the maintenance of a compact and moist seed-bed in the fallow.

Diseases.

Nearly all the crops inspected were badly affected with loose smut, and flag smut also was common. The prevalence of loose smut led many farmers to associate its occurrence with the dry season, and others concluded that the wheat was infected because the seed had been treated with copper carbonate dust instead of formalin or bluestone.

A good deal has yet to be learned about wheat diseases and the conditions which favour their development, but the life histories of the organisms causing the common diseases have been studied. They are caused by fungi. Ball smut, loose smut, and flag smut are quite distinct. The black powdery spores by which we recognize them are the seeds which carry the infection. The mode of infection in each case is different, and researches show that loose smut infects the wheat plant at flowering time, and is present inside the grain when it forms. Consequently external treatment of the grain by pickling or dusting with fungicide does not avail to destroy the loose smut. Because of the big percentage of loose smut in particular varieties, some farmers decided that the varieties were more susceptible, e.g., a crop of Wannon was particularly badly infected, but, on the other hand, another crop of Wannon inspected was one of the cleanest seen. So also with Federation. The difference in susceptibility to rust often distinguishes varieties, but there does not appear to be a like difference in regard to loose smut. If the seed be obtained from a crop showing a big proportion of infected plants, the chances are that the crop produced will show a lot of infected plants. For that reason it is suggested that farmers should get their seed for 1926 from crops which show the least infection. It will be interesting to see if next year's crops show a like degree of infection. If they do not, the probable explanation will be that the florets of the wheat did not open so freely this season.

Dry pickling as a preventative for ball smut is becoming more popular. Farmers have been impressed with the more rapid and thicker germination it induces, as well as the great convenience attendant on its use.

The favorite wheat is still Federation, which has maintained its prestige this season, but the susceptibility it showed to rust in 1924 led many to begin a search for a better wheat, and so several plots of new varieties were seen. Some farmers are ready to condemn varieties which have not acquitted themselves well this season, e.g., Major had a vogue during the last few years when good finishing rains occurred, but because it has tipped this season several are inclined to discard it.

A pleasing feature of the crops was that most of them show a high standard of purity.

Details of Points Allotted.

Competitor.	Apparent Yield.	Trueness to Type.	Absence of Weeds.	Freedom from Disease.	Evenness.	Total.
Possible points ..	35	20	15	15	15	100
BLACK GROUND.						
A. Reseigh	35	19	13	14	13	94
D. Wells	34	19	14	13	13	93
L. Wells	32	19	14	14	13	92
W. J. Bassett ..	33	19	13	13	13	91
C. W. Bassett ..	30	19	14	12	14	89
L. L. Bassett	30	19	13	13	14	89
F. W. Young	28	19	14	14	12	87
RED GROUND.						
H. Hancock	32	19	13	14	13	91
G. Pope	28	19	11	13	13	84
A. P. Bauld	25	19	13	14	12	83

AGGREGATE POINTS.

Competitor.	Fallow, 1924.	Crop, 1925.	Aggregate.
Maximum Points	100	100	200
BLACK GROUND.			
A. Reseigh	99	94	193
C. W. Bassett	97	89	186
D. Wells	92	93	185
L. L. Bassett	95½	89	184½
W. J. Bassett	93	91	184
L. Wells	91	92	183
F. Young	94½	87	181½
A. Clifford	95	(not shown)	
G. Flett	95	,,	
C. Coates	95	,,	
R. Adams	93	,,	
W. Pope	91	,,	
H. S. Pope	90	,,	
J. Coates	89½	,,	
C. Tonkin	89	,,	
RED GROUND.			
H. Hancock	94	91	185
G. Pope	85	84	169
A. P. Bauld	83	83	166
W. Sproat & Co.	77	..	..

How the Best Crops were Raised.

Mr. Allan Reseigh's crop of Federation made an excellent exhibit, although slight irregularities in drilling were noticed. It was not a tall crop, but it was well headed. Only very little loose smut showed.

but some flag smut was apparent throughout. A sprinkling of wild oats, poppy, and mustard was showing.

This crop was grown on land which bore a crop of wheat in 1923. In April, 1924, the stubble was burnt, and the land was then scarified 2½ inches deep and left till the end of August, when it was again scarified and harrowed. After a fortnight another harrowing was given. At the beginning of October the land was scarified, and two weeks later harrowed. During the second week in November another scarifying was given, followed by the harrows. The land was left till the end of March, when it was again harrowed. In May it was scarified 2 inches deep, and the crop was sown in the second week of June with 70 lb. of seed, treated with copper carbonate, and 170 lb. of super. per acre.

As usual, Mr. D. Wells presented an excellent exhibit of crop, uniform and level, relatively pure, and free from weeds except for odd wild oats and barley plants. Flag smut was showing, and loose smut was too common. Where the combine had been used for seeding, this crop reflected careful workmanship, but a section seeded with the box-plough showed misses. The major portion was grown on land ploughed for fallow in July, 1924. A section on the north side was ploughed earlier, in April-May. This autumn-fallowed section received in all fifteen workings, and the winter fallow was given ten. The skim-plough, rigid tyne cultivator, and harrows were the implements used. The period of sowing was from 22nd June to 4th July, the rate of seeding being 90 lb. of formalin-pickled seed with 1 cwt. of 22 per cent. super. per acre. The land was harrowed after sowing, and sheep were permitted to graze the crop lightly.

Mr. Louis Wells's crop was noteworthy, because when inspected it was still green and gave promise of finishing well, despite the fact that practically no rain had fallen for weeks. (Rain which fell subsequently would be of great advantage to this particular crop.) It had an attractive appearance, showing only a few barley plants and a sprinkling of wild oats. Loose smut was common, but it was the only disease apparent. The crop was grown on winter fallow, skim-ploughed in July, 1924, 3½ inches deep, and harrowed immediately afterwards. It was cultivated with the rigid tyne cultivator (fitted with 5-in. shares) four times between July and November. It was harrowed after harvest time, then cultivated and harrowed. This was repeated in June, and the crop was sown with the combine during the first week in July; 75 lb. of seed, pickled in formalin, with 112 lb. of super., were used per acre.

Mr. Hancock's exhibit of crop on red ground was two plots of Rajah and Ranee, and they made an excellent show, fairly even, though there were a few patches shorter than the average; but it was regularly drilled, and there was no undergrowth, but patches of wild oats and a few plants of soap-wort showed up.

Mr. Hancock has found these two new varieties very satisfactory. In 1924 they averaged 45 bushels per acre because they proved relatively immune from rust. Both strip well, but Rajah may have a tendency to shed its grain.

This year's crop was sown with the rigid tyne combine in June, with 80 lb. of "dry pickled" seed and 100 lb. of super. to the acre. It was harrowed shortly after sowing. The land on which the crop was grown had been out of cultivation for six years prior to 1924. It was skim-ploughed in June 4 inches deep, and harrowed, harrowed again and skimmed in July, left till October, and cultivated with the rigid tyne combine. This cultivation was repeated in November. The fallow was harrowed in February and left till April; it was then skimmed, and harrowed shortly after.

BEULAH CROP AND FALLOW COMPETITIONS, 1925.

Report of Judge, J. E. Harrison, B.Ag.Sc., Science Field Officer.

Judging in the above competitions was carried out during November. Crops were ripening. Fallows, for the most part, had lain idle for several weeks owing to a spell of dry weather. In spite of this dry spell, the district as a whole was full of promise. Growers unhesitatingly credited their success in a season like the present to improved agricultural methods, and the Crop and Fallow Competitions are regarded as having done much towards a general adoption of these. This educational aspect of competition is very wholesome. It is something, too, in which every one may share.

Details of Awards.

No. 1.—Crop Competition—Soldier Settlers.

Name.	Variety.	Yield.	Trueness to Type.	Absence of Weeds.	Absence of Disease.	Evenness.	Total.
Possible Points ..		35	20	15	15	15	100
Kennedy, J. R. ..	Penny ..	21	18	14	11	15	79
Pendlebury, F. ..	Penny ..	18	20	13	13	15	79

No. 2.—Fallow Competition—Soldier Settlers.

Name.	Moisture.	Mulch.	Absence of Weeds.	Cultivation.	Total.
Possible Points	25	25	25	25	100
Kennedy, J. R.	20	24	24	23	91
Pendlebury, F.	20	23	24	22	89
George, H. V.	15	23	25	22	85
Woods, W. R.	15	23	24	22	84

No. 3.—OPEN CROP COMPETITION.

Name.	Variety.	Yield.	Trueness to Type.	Absence of Weeds.	Absence of Disease.	Evenness.	Total.
Possible Points ..	..	35	20	15	15	15	100
Hoffmaier, N. C. ..	Penny (Ex. B)	35	19	14	14	13	95
Wardle, F. A. ..	Bald Early	24	20	13	13	15	85
Hovey, F. ..	Bald Early Federation	24	18	14	14	14	84
Hart, W.	Dart's Imperial	27	16	13	14	14	84
Hoffmaier, N. C. ..	Yandilla King (Exhibit A)	24	18	13	15	13	83
Couzner, F. ..	Penny Major	21	18	13	15	15	82
Holdsworth Bros. ..	Currawa	24	17	14	14	13	82
Williams, W. L. ..	Gallipoli Penny	21	20	12	14	14	81
Kennedy, J. R. ..	Penny	21	18	14	11	15	79
Couzner, A. G. ..	Federation	21	18	13	11	14	77
Gneil, J. & L. ..	Penny	21	18	14	8	14	75

Name of Competitor.	Moisture.	Mulch.	Absence of Weeds.	Cultivation.	Total.
Possible Points	25	25	25	25	100

No. 4.—OPEN FALLOW COMPETITION.

Hoffmaier, N. C.	22	25	24	25	96
Collins, W. J.	20	25	25	24	94
Gniel, W. H.	20	25	24	25	94
Wardle, F. A.	20	23	25	24	92
Bodey Bros.	22	24	22	23	91
Kennedy, J. R.	20	24	24	23	91
Hovey, F. M.	20	23	23	24	90
Couzner, A. G.	20	23	23	23	89
Cook, G. W.	18	23	24	23	88
Hoffmaier, F.	18	23	23	23	87
Gniel, F. K. (exhibit "B")	16	23	24	24	87
Gniel, F. K. (exhibit "A")	15	23	25	23	86
George, H. V.	15	23	25	22	85
Mason, Bros.	18	22	22	22	84
Couzner, F.	15	22	25	22	84

No. 5.—FALLOW AND CROP COMPETITION—2 YEARS.

Hoffmaier, N. C. ..	22	25	24	25	96
Collins, W. J.	20	25	25	24	94
Wardle, F. A.	20	23	25	24	92
Bodey Bros.	22	24	22	23	91
Kennedy, J. R.	20	24	24	23	91
Hovey, F.	20	23	23	22	90
Couzner, A. G.	20	23	23	23	89
Cook, G. W.	18	23	24	23	88
Hoffmaier, F.	18	23	23	23	87
Gniel, F. K. (2)	16	23	24	24	87
Gniel, F. K. (1)	16	23	25	23	87
Mason, D.	18	23	22	23	86
Holdsworth Bros. ..	18	23	23	21	85
Couzner, F.	16	22	25	22	85

In the crop competition for soldier settlers there were only two entrants, who came equal in points. Mr. Kennedy's crop was a good one, blighted to some extent by frosts and hot winds. It was not free from disease. Mr. Pendlebury's crop was light, but distinctive on account of its trueness to type.

Mr. J. R. Kenndy won the Fallow Competition for soldier settlers with an award of 91 points. One hundred acres of uniform red loam, with a fairly heavy clay subsoil, was exhibited. An effort had been made to increase the depth of cultivation of previous years. Mr. Kennedy had, however, shown great care, and brought no more than traces of the subsoil to the surface. Summer fallowing had been practised, the land being cultivated in April, skim-ploughed and harrowed in July, spring-toothed in September, and harrowed in November.

Second prize was awarded to Mr. Pendlebury with 89 points. The exhibit consisted of limestone country, rising to a sandy ridge. Two

The Attractive Farm Home of Mr. W. J. Collins, President of the Society.

discings had been given the land, a scarifying, and a spring-toothing. It was thought that cultivation had been rather deep. Unless care is taken, this will result in deep sowing with the likelihood of poor germination. The deep mulch, however, was effectively conserving moisture in the soil.

Both the remaining exhibits had shallow though fine mulches. A crust of dry soil had to be broken through before the moist subsoil was reached. Neither was a ploughed fallow, but both had received a number of workings.

The open crop competition was won by Mr. N. C. Hoffmaier with 95 points. A heavy field of Penny was exhibited. Mr. Hoffmaier said that the field had been irrigated in August by an overflow from a water channel. He was afraid at the time that he would lose the crop, but when the inspection was made, the field was an illustration of what water will do in the Mallee. Apart from the heavy yield, however, the crop was true to type, free of weeds and disease, and well worthy

of the prize. It had been sown on an early winter fallow, at the rate of 70 lb. of graded seed, with 80 lb. of superphosphate.

Mr. F. A. Wardle gained second prize with 85 points for a crop of Bald Early. It was very true to type, well headed and even. This crop had been sown in early June at the rate of 75 lb. seed and 95 lb. of manure to the acre. It was harrowed when the plants appeared above ground, and Mr. Wardle believes this had much to do with the destruction of weeds.

Third place is shared by Mr. F. Hovey and Mr. W. Hart. The former presented a good crop of Federation and Bald Early, well up in all points. Apart from the winning crop, Mr. Hart's was the heaviest inspected, but, unfortunately, it contained numbers of foreign ears. It was grown on a winter fallow, which was cultivated twice in the autumn before being sown in late May with 80 lb. seed (Dart's Imperial) and 96 lb. of manure.

The Winning Crop—Mr. N. C. Hoffmaier's.

The next four on the list presented good average crops. That of Mr. W. L. Williams deserves special mention for the Gallipoli portion; it was very well headed, often four grains across, true to type, and free from disease. The presence of iron weed cost this exhibit several points, but Mr. Williams believes he can successfully combat this weed. His intention is to sow half the manure in autumn, and encourage good weed growth before sowing the crop. The benefit, however, will probably be indirect, and the extra workings will account for increased germination and destruction of the weed.

The remaining crops lost points for the presence of preventable disease.

In the open Fallow Competition some excellent exhibits were shown. Mr. N. C. Hoffmaier gained first place and so won two first prizes in this year's competition. His fallow consisted of an even red loam on a ridge side. The mulch was in perfect order, and the seed bed beneath was even, well consolidated, and moist. Cultivation consisted of skim-ploughing 3½ inches deep at the end of June, two harrowings in July,

skim-ploughing in August, followed by two cultivations and a harrowing, a further skim-ploughing and a final harrowing.

Mr. W. J. Collins and Mr. W. H. Gniel shared second place with 94 points for clean, well-worked fallows. In both cases the soil was a fairly heavy loam, called a "strong" soil in the district, and cultivation had been thorough and frequent. Mr. Collins had cultivated his land in February, ploughed in June, harrowed in July, cultivated and harrowed in August, cultivated and harrowed in October, and harrowed in November. The fallow of Mr. Gniel had been ploughed in March and harrowed down immediately, cultivated and harrowed in April, harrowed in May, cultivated and harrowed in each of the months June, July, and August, and cultivated again in October.

The remaining exhibits were generally good in view of the season. Many waited for rain that they might cultivate and readily secure a

An Effective Sunshade seen at Mr. Hoffmaier's.

It is closed in at the rear, and the grain box may be kept open.

good mulch. This season was one, however, where numerous workings were required early after ploughing before a fine, loose mulch could be secured. It was noticeable that ploughed fallows were in better order than those that had been worked with the scarifier or spring-tooth only.

Since nearly all the entrants for the Open Fallow Competition exhibited in the Fallow and Crop Competition, two years, the awards are much the same, and no special mention is made of the exhibits.

Notes and Remarks.

Many growers ask what is a good mulch. The requirements are, briefly, that a mulch be fine, loose, and dry. If it fulfils these three essentials, then its effectiveness in preventing evaporation of moisture

from the soil below will depend on its depth. This will be regulated by the depth of the first ploughing, which raises another question calling for a special reply.

If we cut a perpendicular face 8 or 9 inches deep into a soil, we find usually that it consists of two parts. There is first of all the surface soil, or soil proper. It is usually darker in colour than the subsoil, and is rich in vegetable matter and available plant foods. If a wheat plant is taken out with a spadeful of soil and the roots shaken, the mass of the roots will be found growing near the surface in the soil proper. The subsoil is usually lighter and brighter in colour. It is poor in vegetable matter and available plant foods, but is a storehouse of moisture. The importance of this is that it is only the surface soil which should be moved in cultivation. Ploughing should not be deeper than the soil proper. The depth of ploughing then depends on the depth of soil, which, of course, varies throughout a district and even

Mr. F. A. Wardle's Crop of Bald Early.

from field to field. Examination will readily show the depth of soil in any field, and give a sure guide as to what depth the farmer may safely plough.

As to the amount of working necessary, this depends on the nature of the soil, rainfall, and growth of weeds. The heavier lands need more cultivation than the sandy ridges. Once the mulch has been worked down fine and loose, cultivation is necessary only after rain, or to destroy weeds.

Loose smut or "blow" smut (*Ustilago tritici*) was prevalent in some crops. The black ears, powdery to the touch, are well known, and easily picked out. This black powder consists of minute spores, equivalent to the seed of ordinary plants. It is blown about by the wind during the flowering season, when infected heads are usually higher than the rest of the crop. If spores lodge in the flower of a healthy plant they send out a fine tube which penetrates and grows within the developing grain. This is why pickling with copper sulphate, &c., is not effective against the disease. Avoidance of seed from

infected crops is the only practical measure against it. When an infected grain is sown and germinates, the fungus grows internally in the straw, keeping pace with the growing point. At the same time as the ear is developing in the flag, the fungus itself forms masses of spores, and the ear emerges as a typical head of loose or blow smut

Stinking smut or Ball smut (*Tilletia tritici and Tilletia levis*) had damaged several crops. Growers should realize that the first precaution against this disease is the selection of seed from a clean crop. Grading, besides selecting only the best grain, will remove most grains of Ball smut that may be present. Pickling by any of the approved methods is the final safeguard.

The work of judging was facilitated by the careful arrangement of each day's itinerary, and the attention and courtesy of the secretary, Mr. A. J. Williams, and many others was greatly appreciated.

MANANGATANG CROP COMPETITION, 1925.

Report of the Judge, J. Brake, B.Agr.Sc., Chief Field Officer.

In the judging of crops from Kooloonong and Sea Lake on the east to Pinnaroo on the west, the outstanding feature noticed was the success of crops on fallowed land over those sown on non-fallow. This observation is supported by this year's results from the experimental plots at Walpeup conducted for the Department by Mr. R. C. F. Gniel. The half-acre non-fallow plot yielded 12½ bushels per acre of Federation wheat, whereas the average of two quarter-acre fallowed plots was 22 bushels per acre. Thus fallowing nearly doubled the yield.

What is "Fallow?"

Just what is meant by the term "fallow" should be thoroughly understood, or it is easily possible to under-estimate its advantages. One sometimes hears the remark about a poor crop: "I cannot understand it. That crop was grown on fallow." But, when inquiries are made, it is found that the land was far from being *real* fallow; it may have been ploughed twelve months before sowing, but by neglect and incorrect workings had been ruined as a moisture saver or as a seed-bed for the crop.

In the preparation of the soil for the crop, the aim should be to commence fallowing as early as possible, say April; then work the land as often as is required to retain the loose surface mulch; each successive working should be carried out with the idea of building up by sowing time a firm seed-bed, about 2 inches below the surface.

The cultivation should be performed after rain, but sometimes it is impossible to wait for rain; in such an event great care should be taken to make the working very shallow, so that no moisture is turned up to the surface to be lost by evaporation.

The Objects of Fallowing.

The objects of fallowing may be briefly set down as—

1. The storing up in the soil for the use of the crop of as much as possible of the rain that falls during the preceding year. This is effected by keeping on the fallow a permanent loose surface mulch to a depth of about 2½ inches.
2. The release of plant food by the work of the millions of bacteria in the soil; these bacteria produce best results when the soil is kept in a mellow, well-worked condition.
3. The preparation of a perfect seed-bed for the crop. For the best growth of the plant the seed should be placed on a firm, moist bed underlying a loose surface mulch.
4. The spreading of the cultivation more evenly throughout the year, thus making it easier to get seeding operations carried out at the right time.
5. The cleaning of the land of weeds and disease by causing them to germinate before the sowing of the crop; the weeds should be killed by cultivation, or preferably eaten off by sheep as soon as practicable after showing above ground, otherwise they will use up a large quantity of the moisture stored up in the fallow. When the disease spores germinate in the absence of plants to act as hosts, the disease is left without food, and dies.

The whole-hearted adoption of the principles of fallowing in the Manangatang district is absolutely essential for progress, and should be brought about just as soon as ever funds will allow; even in the first year a portion of the land cleared should be placed under fallow, and profit will surely result.

These statements, far from being based on theory, have a wealth of practical experience to support them. In the older settled Mallee, as a result of ten years' work and the adoption of "better methods," were to be seen even in this dry year crop after crop yielding six, seven, and eight bags per acre.

The quarter-acre experimental plots at Walpeup grown in accordance with these principles, and under ordinary farm conditions, averaged in this, their first year, more than seven bags per acre. With a knowledge of results like these, the live man in the Mallee to-day realizes the tremendous importance of fallowing, and knows that he must either practice it in its broadest sense or fail in his business as a wheat-grower.

Manangatang, being a comparatively new district, cannot be credited with many good fallows yet, but there is evidence of a definite general move in the right direction. It is hoped that the points outlined above may help to a better understanding of the actual requirements in fallowing.

There are other factors affecting the crop yield which go hand in hand with improved fallowing, and should not be disregarded. These are time of sowing, rate of seeding and manuring, selection of pure high-yielding varieties of seed, prevention of disease, and the adoption of a systematic rotation of crops.

Remarks on Competition Crop.

In the competition crops the wheat was far from pure. It is recognized that it is not easy to obtain pure seed, but that difficulty should be partly met in the next few years by the supply of departmental seed, and also by the establishment of more experimental plots, from which the farmers conducting the plots will be able to develop good supplies of pure seed for distribution. The benefit to be gained by farmers from the plots in this way is well illustrated by the purity of the crops at Murrayville, where the majority of the seed was obtained from the local plots.

A Sample of Currawa Hay grown by Mr. I. A. Sharp.

In regard to disease, loose or blow smut was present in much greater quantity than it was seen later in the Wimmera crops. This disease leaves the smutty skeleton of the head standing in the crop; most of the smut blows away at the flowering time and lodges in the flowers of the healthy plants, where it lodges in what later becomes the grain; the grain develops normally, but the germ is present internally, and it is impossible to dislodge it by ordinary pickling methods. When this affected grain is used for seed, the disease grows up with the plant and replaces the grain with blow smut as before. To avoid loose smut, endeavours should be made to purchase disease-free seed; if possible, the wheat should be inspected before it is harvested, and should be rejected if there is much smut present.

Ball smut or bunt may be regarded as a controllable disease, consequently its detection in a competition crop entails a rather severe loss in points. If a man is careful to obtain seed as free as possible from the disease, and then pickles correctly as well, he need have nothing to fear. Ball smut was found in a number of the crops inspected.

Very little take-all was seen in the crops this year; the wilted, dried-off appearance of portions of them (generally on the lower ground)

Mr. L. Lambert's Crop.

Mr. I. A. Sharp's Crop of Gluyas Wheat at Manangatang.

was without doubt due to lack of moisture. This will be avoided in future years by better fallowing.

In the "absence of weeds" section, most competitors lost points on account of barley being present; wild oats and mustard were also very general. Weeds require supplies of moisture and plant food for their growth, and naturally the bigger they are allowed to grow the greater will be their need. Consequently, the earlier they are fed off

or killed, the more moisture and food will be conserved in the fallow for the succeeding crop.

The absolute necessity of keeping sheep was very clearly seen in the judging of the Manangatang crops. Invariably the better and cleaner crops were growing on fallows which had been kept clean with sheep. Every endeavour should be made to introduce sheep to the farm at the earliest opportunity.

Full marks for evenness were not gained by a single competitor, every crop having more or less numerous "hare tracks." Apart from the waste of land, these misses always carry a dense crop of weeds instead of wheat; they are really a source of trouble, which can easily be corrected with a good deal of profit in several directions.

Generally speaking, the progressive spirit in the air of the district, and the good solid progress already made on numbers of the farms, is convincing proof that success must come. The remarks made in this article may appear a little harsh in some ways, but there is no doubt that the big advance in yields which is confidently expected

Scooping out a Dam near Koolconong Station.

in the newer Mallee can only be brought about by every man basing his methods on the recognized principles of wheat-growing, briefly outlined above, which have enabled the farmers of the Wimmera and older Mallee to reap such big returns in recent years.

Messrs. G. R. Wilkinson, J.P., E. R. Amos, and P. F. Cloonan, who gave their time freely and supplied cars for the use of the judge, are due for the thanks of the district. Without the aid of public-spirited men it would be practically impossible to carry on crop competitions, a point which can well be remembered by the retired and "better-off" residents of all districts.

In the Cloonan Cup there were fourteen entries. Mr. I. Sharp gained first place with 74 points, whilst Mr M. Gray was second with 73.

There were seven entries for the Manangatang Cup competition, and the first place went to Mr. L. Lambert's crops of Gluyas and Ranee, which gained 90 points out of 100; second place was gained by Mr. C. Connell's crop with one point less. Both crops promised good yields, and were fairly true to type. There was a quantity of loose smut present in Mr. Lambert's, whilst Mr. Connell's was remarkably

free from disease. Both exhibits were very clean of weeds, only one point being dropped by Mr. Lambert on account of the presence of a patch of mustard.

Comments on Crops.

I. A. Sharp.—Even crop, although flats were dried off to some extent; plump grain, fairly pure; a little loose smut and a trace of flag smut found. Barley heads present, and mustard on flats.

M. Gray.—Heavy crop of portion of Gallipoli; number of strangers seen. Very little loose or flag smut. Crop sown before the rain on 11th May was noticeably free from mustard; that sown a week after rain had a lot of mustard and weeds present.

L. J. Molyneux.—Fairly pure crop, the average quantity of loose and flag smuts present; mustard, and a quantity of cockspur.

J. M. Julian.—Not many strangers seen. Flag and loose smut. No wild oats, but a fair amount of barley.

J. F. Thomas.—Seed badly mixed. Flag smut and loose smut were seen as usual, but, in addition, ball smut was found in the Rajah. There was a lot of barley and a fair amount of mustard on the flat.

H. W. Brown.—Ball smut found, also flag and loose smuts. Mustard present in Federation and a quantity of barley. Not very pure.

W. Sullivan.—Purity of type below average. Presence of loose and flag smuts normal. Barley, barley grass, and mustard present.

The points enumerated above may also be applied generally to the remainder of the exhibits.

Awards.

Name of Competitor.	Apparent Yield.	Purity of Type.	Freedom from Disease.	Freedom from Weeds.	Evenness.	Total.
Maximum Points	**35**	**20**	**15**	**15**	**15**	**100**
			Cloonan Cup.			
Sharp, I. A., Kulwin ..	19	18	13	12	12	74
Gray, M., Nandaly ..	20	15	13	12	13	73
Molyneux, L. J., Manangatang	19	18	12	11	12	72
Julian, J. M., Mityack ..	15	16	13	11	12	67
Thomas, J. F., Kulwin ..	15	12	11	11	11	60
Brown, H. W., Manangatang	15	12	10	11	12	60
Sullivan, W., Kooloonong ..	9	14	13	10	11	57
Fisher, C. H., Kooloonong ..	9	14	12	9	12	56
Drury, D. F., Sea Lake ..	7	15	11	12	11	56
Johnston, S. R., Manangatang	7	16	12	8	10	53
Warren, C., Chillingollah ..	9	14	12	8	9	52
Glowry, H., Sea Lake ..	4	14	13	6	10	47
Lambie, T. S., Manangatang	6	15	13	4	8	46
Baker, A. H., Manangatang	4	14	13	3	3	37
			Manangatang Cup.			
Lambert, L., Manangatang ..	33	18	12	14	13	90
Connell, R. C., Manangatang	29	18	14	15	13	89
Sharp, I. A., Kulwin ..	19	18	13	12	12	74
Vanderfeen, A. D., Pier Millan (A)	16	17	13	12	13	71
Wharton, R., Manangatang	15	17	14	12	12	70
Wharton, R., Manangatang (B)	13	16	13	10	10	62
Heller, L., Kulwin	9	16	13	11	11	60

AGGREGATE OF FALLOW AND CROP ON FALLOW.

Competitor.	Fallow.	Crop on Fallow.	Grand Total.
Maximum points	**100**	**100**	**200**
CLOONAN CUP.			
L. J. Molyneux, Manangatang	91½	72	163½
I. A. Sharp, Kulwin	88	74	162
M. Gray, Nandaly	85	73	158
J. M. Julian, Mityack	89	67	156
J. F. Thomas, Kulwin	90½	60	150½
C. H. Fisher, Kooloonong	88	56	144
H. W. Brown, Manangatang	82	60	142
D. F. Drury, Sea Lake	84	56	140
W. Sullivan, Kooloonong	80	57	137
S. R. Johnston, Manangatang	80	53	133
T. S. Lambie, Manangatang	86	46	132
C. Warren, Chillingollah	76	52	128
A. H. Baker, Manangatang	85	37	122
H. Glowry, Sea Lake	75	47	122
MANANGATANG CUP.			
L. Lambert, Manangatang	95½	90	185½
I. A. Sharp, Kulwin	88	74	162
R. C. Connell, Manangatang	71	89	160
R. Wharton, Manangatang	86	70	156
A. D. Vanderfeen, Pier Millan	75	71	146
L. Heller, Kulwin	76	60	136

VEGETABLE AND FRUIT REFUSE.

For Free Distribution.

At both the Queen Victoria and the Western Markets great quantities of vegetable and fruit refuse are left on market days in both the stands and the bins by growers and dealers. This refuse is suitable for food for poultry and pigs and though it is available for free distribution, at present but little is taken away and the greater part has to be destroyed.

In most city markets refuse of this kind is much sought after for fodder, and such of it as is not suitable for feeding to stock is used for manure.

The Superintendent of Markets, Town Hall, will be glad to hear from any one who would like to obtain some of this waste material, which can be had free by those willing to cart it away.

WILLAURA OAT CROP COMPETITION, 1925.

Report of Judge, P. D. McRae, Field Officer.

This competition comprises two section, viz., section 213, oat crop of 50 acres; and section 216, oat crop of 25 acres, limited to returned soldiers.

The lateness of the season in the Willaura district was last year highly favorable to cereal crops, and enabled them to take full advantage of the heavy rains which, in many parts of the State, arrived when crops were already well on the way to maturity. It was expected that the crops in this competition, which at the time of inspection were still somewhat green, would be much benefited by the downpour, and would finish well.

It was not specified whether they were to be judged on their hay or on their grain yields, therefore, as they were, when seen, approximately ready to cut for hay, they were judged on that basis.

There were three entries in each of the above-mentioned sections, and points were alloted as follows:—

Details of Award.

Competitor.	Yield.	Absence of Weeds.	Absence of Disease.	Evenness.	Total.
Possible points	40	20	20	20	100
SECTION 213, OAT CROP OF 50 ACRES.					
R. Grimmer	38	19	16	17	90
W. Johns	35	15	18	16	84
J. Shalders	27	18	15	16	76
SECTION 216, OAT CROP OF 25 ACRES—RETURNED SOLDIERS ONLY.					
R. S. Ferguson	37	18	19	17	91
L. J. H. Austin	30	19	19	18	86
J. P. Flynn	24	19	18	18	79

Mr. Grimmer had some difficulty in getting his ploughing done. He commenced early in July, but, owing to the ground becoming boggy, the work was not completed until October. After rain in January, the disc harrows were put over the land, and in March it was again worked with a one-way disc. In April it was harrowed, and towards the end of that month was sown with a combine and harrowed, 1¾ bushels of seed and 150 lb. of superphosphate being used.

As might have been expected, this thorough, but not too frequent, cultivation, produced a sound, and, on the whole, a heavy crop, almost perfectly free from weeds; just a few plants of barley were present, as well as a little loose smut.

The crop shown by Mr. Johns was also a very fine one for the season. Although somewhat uneven, it was, generally speaking, tall and dense, and practically free from disease. Unfortunately, it contained a good deal of barley, and there were also a few thistles and some undergrowth.

The land was ploughed in July-August to a depth of from 4 to 4½ inches, undercut about March, skim-ploughed in April, drilled the first week in May, and harrowed, being sown with 70 lb. of seed and 112 lb. of superphosphate.

Mr. Shalders's crop was somewhat uneven, and there was a good deal of loose smut present. It was almost entirely free from barley and weeds.

The land was ploughed in July to a depth of 5 inches, skim-ploughed 3 inches deep in November and again in March, and spring-toothed before drilling during the first week in May. The quantities of seed and manure used were respectively 80 lb. and 112 lb. per acre.

Returned Soldiers' Section.

In the returned soldiers' section Mr. R. S. Ferguson scored best, and that with a minimum of cultivation. The land was ploughed in April, disked in May, and sown with a drill early in the latter month. The quantity of seed used was also light—60 lb., with 112 lb. of superphosphate.

This was a fairly good crop, but was somewhat thin, and contained a great deal of wheat, as well as some barley and undergrowth. It was apparently quite free from smut.

Mr. L. J. H. Austin's crop when seen was very green; it was thin and short, but was almost perfectly free from weeds and disease. Considering the cultivation it received, it should have yielded better; possibly, had it been sown earlier, it would have given more satisfactory results. The land was ploughed in November 4 inches deep, and then harrowed, re-ploughed in March, cultivated the same month and again in April, and sown at the end of May. Mr. Austin used 90 lb. of seed and 112 lb. of superphosphate.

Mr. J. P. Flynn ploughed his land to a depth of 4½ inches in September-October, and harrowed it two weeks later. It was not touched from that time until early in May, when it was skim-ploughed, harrowed, drilled, and again harrowed. It was seeded at the rate of 80 lb., with 100 lb. of superphosphate.

Although this was a nice level crop, it was somewhat light, and strips of ground had occasionally been missed by the drill. It was very green, and contained practically no weeds and very little smut.

From the details of cultivation supplied by competitors it would appear that the fallows were cultivated this year much more thoroughly than last year. If this should be the case, it is undoubtedly a step in the right direction.

Possibly more summer tillage, especially after rain, would be found advantageous, and, in this connexion, it is noteworthy that Mr. Grimmer produced an excellent crop on land which had been cultivated in January.

Loose smut and a considerable growth of barley constituted serious defects in the crops. In order to overcome them, pure seed only should be used, and this should be pickled by immersing it in formalin, at a strength of 1 lb. of formalin to 40 gallons of water, for from 3 to 5 minutes. It should be understood that this treatment is ineffective for loose smut of wheat.

THE CAPONIZING OF COCKERELS.

J. E. Thomas, B.Sc., B.V.Sc., B.Agr.Sc.

The Reasons for Caponizing.

The problem of the profitable disposal of cockerels has always been an acute one with poultry keepers. The fattening of table poultry as a special line has never yet become popular in Australia, and the class of cockerel sent to the sale rooms is usually a poor one

Fig. 1.—Abdominal Contents exposed in a Dead Bird showing Upper Testicle in Spoon.

(1) Upper testicle. (2) Lower testicle. (3) Kidney. (4) Liver. (5) Gizzard. (6) Bowels.

Under present conditions they are barely profitable, and, as a result, there has been an interesting development within recent years of sex-linked inheritance—a method of cross-breeding whereby the sexes can be early recognized by distinctive body markings. The cockerels can then be disposed of. Cross breeding is not, as a rule, advisable for egg production, and for that reason, if practised, would probably be restricted to the lesser known breeds.

To make the rearing of cockerels profitable, caponizing has long been carried out in the old world. The advantages may be briefly summarized as follows:—

(1) It gives a bird of good growth, and one that responds well to topping-off.
(2) It gives a high quality product.
(3) Birds so treated can be put aside in anticipation of a good market at Easter, &c., and then topped-off.
(4) Capons may be carried in the run at a small cost, with no inconvenience to the rest of the yard.

The disadvantages are—

(1) The capons are usually kept for at least seven months, and will therefore have a high feed cost.
(2) In order to avoid loss, the actual operation requires a little skill.

It is clear that a higher price per pound for the finished product is necessary in order to get a profitable return. Naturally, then, the development and fostering of a market that will pay for quality is a primary consideration. American experimental results give such typical figures as follows:—

Table showing difference in average weight of capons and cockerels during a 33-week growing period, and when fatttened (three weeks allowed for fattening). Also quantity of feed required by each bird to gain 1 lb. in weight.

Average Gain in Weight during Growing Period (33 weeks).

	Cockerels.		Capons.
Weight first week ...	1.13 lb.	...	1.10 lb.
Weight final week ...	6.73 lb.	...	7.42 lb.
Gain in weight ...	5.60 lb.	...	6.32 lb.

Average Gain in Weight during Fattening Period (3 weeks).

Cockerels.		Capons.
.06 lb.	..	.34 lb.

Pounds of Feed Consumed by each Bird while Gaining 1 lb. in Weight.

Cockerels.		Capons.
10.95	..	9.50

Selling Price.

Cockerels.		Capons.
34 cents.	..	55 cents.

Profit per capon, 124 cents. Loss per cockerel, 45 cents.

It will be observed that the capons showed their profit mainly in the topping-off period, and in the higher prices per pound received. At Werribee trials are in progress with White Leghorns, Black Orpingtons, and Sussex crossbreds of various ages, to determine the relative rates of growth of capons and cockerels, and to determine actually what profit, if any, results from caponizing. In the actual topping-off

process, the general consensus of opinion is that milk or milk products are necessary to get quality. Maize and milk seem to be the keystones of American feeding.

How the Operation is Performed.

To those who purpose caponizing, the following description will be serviceable:—

The selected birds should be from two to four months old—usually the younger the better. They should be penned up and allowed no

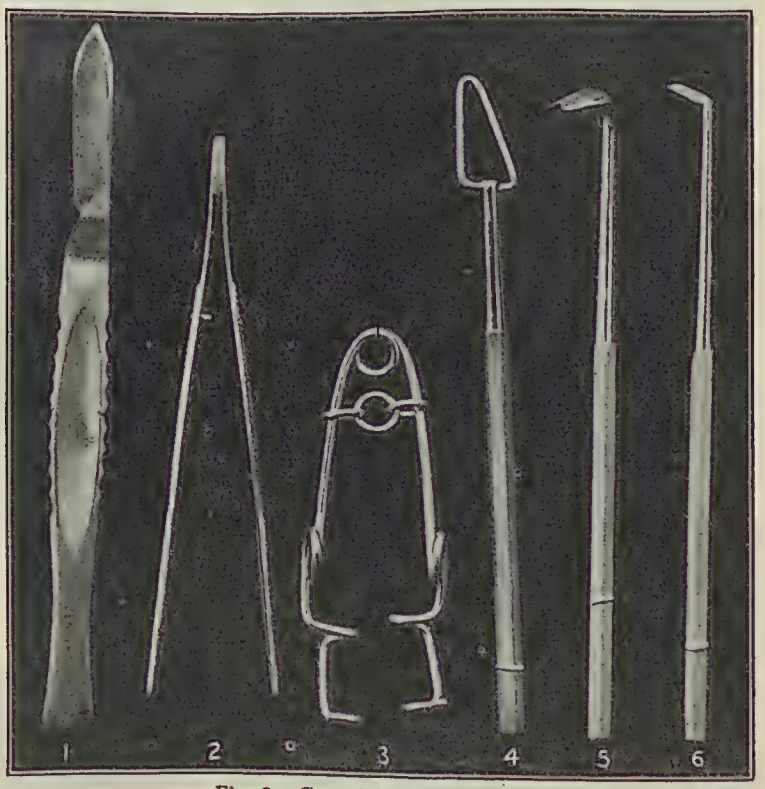


Fig. 2.—Caponizing Instruments.

(1) Knife. (2) Forceps. (3) Spreader. (4) Instrument to push bowel aside. (5) Spoon. (9) Instrument for opening membrane over bowels.

food and no water for at least 24 hours in order that their bowels may be thoroughly empty. The best plan is to confine them in the early morning, and to commence caponizing about noon next day. As a maximum of light is necessary for success, the work should be attempted only on a bright day.

The operator should get some preliminary experience on a dead bird, carefully noting the position of the testicles and their relation to other organs. The relative positions are shown in Figure 1.

The actual instruments required can be purchased in sets from any instrument maker at a cost of about £1, and usually comprise

Fig. 3.—The Bird secured Left Side down.

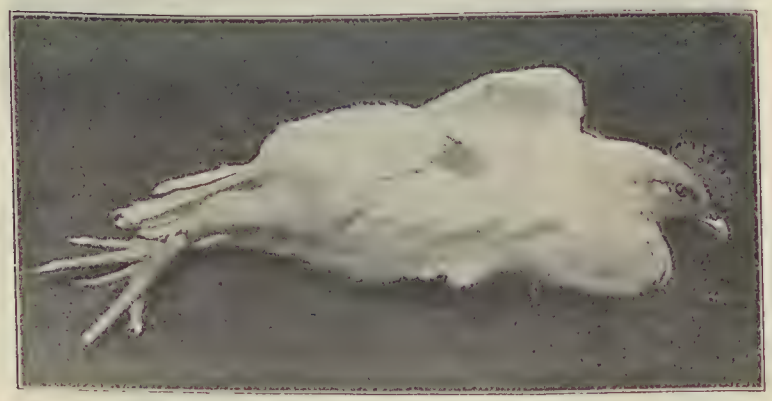


Fig. 4.—Site of Operation between last Two Ribs, in Front of Thigh.

knife for incision, spreader, probe, a spoon or other instrument for picking up and removing the testicle. Typical instruments are figured.

A proper table to work on will save trouble—a box or barrel of correct height for the operator, with two holes drilled in, through which

Fig. 5.—Showing Opening made in Front of Thigh between last Two Ribs with Spreader in Position.

Fig. 6.—Showing Testicle in the Spoon.
(For the purpose of this illustration the testicle is shown outside, but usually it is twisted off inside the opening.)

passes a cord weighted to secure the legs and wings, is very serviceable. The illustration (Figure 3) shows the bird so secured, left side down. The weight over the wings should be no more than just heavy enough to hold the bird in position. The skin should then be moistened with some weak antiseptic, such as lysol, a teaspoonful of which should be

allowed to a pint of water. It is also advisable to keep the instruments in the solution, but all traces of it should be rinsed off before the instruments are used. To carry out the work of caponizing, turn down or remove the feathers in front of the thigh and feel the position of the last two ribs. Push the skin towards the hip and incise the skin just between these ribs. The object of doing this is to cover the flesh wound when the skin goes back to its ordinary position. The flesh beneath is now exposed, and a band of flesh may be seen just overlying the last two ribs running up and down; it will save bleeding if this be pushed back towards the thigh. Then cut the flesh between the last two ribs; the incision should be about an inch in length and the muscle only should be incised. The spreader must now be inserted; on looking into the opening that has been made a glistening membrane will be seen overlying the bowel; carefully perforate this with a hook or forceps, taking care not to injure the organs beneath. The abdominal contents will now be seen; the upper testicle up under the back will be usually plainly visible.

It may be necessary to enlarge the opening between the ribs. The bowel is readily distinguished by its darker colour, whereas the testicle is yellow, and of fleshy consistence. The size of the latter organ varies greatly in different breeds at different ages, and is closely associated with the development of comb. It is preferable to remove the lower testicle first, as then any bleeding will not mask the view. Carefully push the bowel aside with the instrument provided so as to reveal the lower testicle. Different instruments are used for removing the organ —a handy one is the spoon type, as shown. It is preferable to have two of these, of different sizes. Insert the spoon and work it so that it engages the lower testicle with the cord of the organ in the slit of the spoon. Take care that no bowel is entangled. Now carefully twist the spoon so that the testicle and its enveloping coat comes away freely. Repeat the same performance with the upper organ. It is the writer's experience that, if any difficulty is experienced in removing the lower one, it is quicker to cover the wound, turn the bird over, and repeat the same operation as before on the other side. Care should be taken to see that no feathers get into the wound, and that the whole of the testicle is removed. It is neither necessary nor desirable to sew up the wound. The only danger in the operation is injury to the large blood vessels under the backbone. If these are injured, profuse bleeding will occur and death will rapidly ensue. A little care in removing the testicles will, however, prevent this. Once the skin is opened, there is but little pain in the operation. The time occupied when the necessary dexterity is obtained need be only a few minutes, and the bird can be immediately let go to commence feeding. No after attention is usually required, though it occasionally happens that the skin, acting as a pump and valve, sucks in air, and "balloons" up. This can be pressed out through the skin wound or perforated with a needle.

Marked changes in the temperament of the birds occur as a result of this operation. They become very much quieter, the combs begin to shrivel up, and they often develop habits akin to those of the hen. In some parts of the world the heavy breeds are used for looking after chicks.

THE EXPORT OF FRESH GRAPES.

By F. de Castella, Government Viticulturist.

A good many years have passed since hopes were first formed concerning the establishment of a fresh-grape shipping industry on a large scale in Victoria; yet in spite of numerous attempts in the way of trial shipments the progress realized has, on the whole, been disappointing. Some of these have been remarkably successful, whilst others have been failures.

There seems to be no reason why we should not succeed. The climate of our vine-growing districts is similar to that of Almeria, in the south of Spain, where the industry has long flourished. We have successfully imported the Ohanez grape, which, by its remarkable keeping quality, has rendered the Almeria industry possible; it thrives and ripens its fruit as satisfactorily with us as in its native Spain. We have an advantage over Spanish growers in the six months difference in the incidence of the seasons which permits us to land our grapes in Europe in spring and early summer at a time when they have no competition to fear from grapes grown anywhere in the northern hemisphere.

And yet the grape shipping industry is far from being established or even satisfactorily started in Victoria. Since its inception in 1914, when the first shipments on a commercial scale were made, its career has been a checkered one.

The objects of the present article are to briefly outline what has already been done, to consider the causes of failures in the past and to suggest means by which it is hoped they may be overcome in future.

Pre-war Shipments.

Vines of the Ohanez variety were imported from France by the writer in 1908. It was found, however, that this grape had been previously introduced to South Australia by the late Thomas Hardy in the eighties of last century. Cuttings were secured by the Department of Agriculture and sold to intending planters in 1910. Most of these were planted at Merbein, the new irrigation settlement then being established near Mildura. Further plantations were made during the following years in different irrigation districts, and it is estimated that there are now over 100 acres planted with the Ohanez grape in this State.

In 1914 the first shipment of Victorian-grown Ohanez of any importance was sent to London. Prior to this, small trial shipments had been made with other varieties—mainly Doradillo—at different times with varying success. Mention may be made of 21 cases per s.s. *Otranto* in 1911. These fetched 7s. 6d. and 9s. in London. Though the Doradillo keeps fairly well it is dull and unattractive after lengthy storage, thus making it a poor shipping grape.

The 1914 shipment consisted of 500 cases, of which 460 were Ohanez, the balance consisting of Flame Tokay, Purple Cornichon, and Santa Paula. Most of these cases contained 28 lb. nett of grapes, but 63 of them were 22-lb. cases, the inclusion of which in the same shipment proved to be a mistake. The Ohanez fetched 12s. 6d. to 15s., and as

the shipment was sold in an unfavorable market, the results were considered highly encouraging. In those days the charges (exclusive of case and cork filler) amounted to only 4s. 6d. per case.

Shipments to London were interrupted by the war, but mention must be made of a fairly large experimental lot of grapes which was sent to the Panama Exhibition at San Francisco (California), in 1915. This consisted of 47 cases from Merbein—mainly Ohanez with a few Purple Cornichon, Flame Tokay, and Santa Paula—and fifteen cases of Waltham Cross (Rosaki) from Wahgunyah.

Concerning these grapes the officer in charge of the Victorian exhibit wrote on the 15th November, 1915:—

> All our grapes arrived in good order, being well packed. The first lot to arrive included Ohanez, Purple Cornichon, Flame Tokay, and Santa Paula, and the second consignment comprised Waltham Cross, Wortley Hall, Purple Cornichon, and Valensy. On being opened up all the grapes were in very fair condition. . . . The Waltham Cross . . . were, in my opinion the least desirable of any in flavour . . . The Ohanez were easily first. . . . These grapes kept almost in perfect condition up to the time of the closing of the refrigerator about ten days ago. I have still one case in the pavilion—they are sound and retain most of their flavour.

Post-war Shipments.

After the war, grape shipments were resumed, but not immediately. At first the price of the cork filler was prohibitive, and as Ohanez grapes were fetching satisfactory prices on the local and Sydney markets, there was little inducement to export.

The 1920-21 summer and autumn were very wet. At Merbein 6 inches of rain were recorded during February and March, 1921. It was in January, 1921, that downy mildew was first found in Mildura. Spraying had hitherto been confined to sultanas for black spot control, so the unsprayed Ohanez suffered severely both in fruit and foliage. The injury to the latter was, in fact, responsible for a light Ohanez crop the following year (1922). Nevertheless a few lots of Ohanez were shipped in 1921 and 1922. These were not considerable, however, and records concerning them are not available.

In 1923 the first important shipment of Ohanez grapes was made. It consisted of 640 cases* per s.s. *Orvieto*, comprising lots from thirteen different growers. These grapes arrived in good order, and sold so well in London that the future of the industry seemed assured. It is true there were rather marked differences between the prices obtained by different growers, some averaging 23s., 25s., and up to 28s. per case, whilst the averages of others were as low as 12s. 8d. and 13s. These differences show the extent to which the soil and the conditions under which the grapes are grown and packed can influence the carrying capacity of the fruit. The *Orvieto* arrived in London on the 24th May, 1923, and the average price realized for the whole 640 cases was 21s. 3d. per case.

Encouraged by this success, shipments on a larger scale were made in 1924, 11,000 cases being shipped to London, and about 4,000 to New Zealand and the East. Most unfortunately for the grape shippers the 1923-4 summer was a wet one, culminating in a wet and cold autumn. The 1924 vintage will long be remembered by dried-grape growers on the Murray as one of the worst drying seasons on record. The rainfalls

* The case used was the ½ bushel flat case containing 28 lb. of grapes and about 4 lb. of cork filler.

at Merbein for the first three months of these two years are in striking contrast—

	January. Points.	February. Points.	March. Points.
1923	11 ...	23 ...	0
1924	39 ...	228 ...	85

Under such conditions the 1924 grape shipments were foredoomed to failure, and the results were, as events proved, disastrous. Undaunted by this failure, the causes of which were obvious, shipments on a large scale were again made last year, when 10,000 cases were shipped to London, in addition to some 2,000 cases to New Zealand and the East. These grapes were shipped rather late. They arrived in London in June, and the first sales were made on 17th of that month. This was regrettably late, as they had to face the competition of an unusually abundant strawberry crop. Apart from this competition, however, the grapes did not arrive in good order. The condition in which they were marketed was such as to seriously depreciate their value. The causes for this poor condition are not, at first sight, very obvious. When packed these grapes were of exceptionally fine quality. It is open to question if finer Ohanez grapes were ever shipped, and yet they did not keep nearly so well as several previous shipments, notably that of 1923. The summer of 1924-5 was not a dry one. The rainfall of November and December, 1924, was far above the average—January, 1925, was rather above the average, but the two following months were normal.

It is probable that the lack of keeping quality was an aftermath of the wet 1923-4 season. Moulds of all kinds abounded to such an extent that even a year later the soil and old wood of the vines carried resting stages of these fungi to an unusual degree, so that though perfect in appearance the grapes bore in them the germs of decay. It would appear that it takes two seasons to get over the evil effects of such an autumn as that of 1924.

The unsatisfactory condition of the 1925 shipments was commented on as follows by Messrs. Swan and Company, of London, in a report to the Trade Commissioner for Victoria in London:—

These grapes undoubtedly arrived too late, in fact, they reached their destination nearly three weeks later than those shipped last year by the *Argyleshire*. It was the 17th of June before the grapes *ex* s.s. *Orama* could be placed on the market at a time when our own crop of strawberries was being delivered in exceptionally large quantities, and prices for all fruits, which had been steady up to that time encountered a heavy decline. This circumstance also affected the demand for these grapes. If they could have arrived a month earlier, results would have been much better even though they were showing waste. We have to mention, however, that the general show of waste, although it was not pronounced in some instances, was the cause of the buyers operating cautiously and nervously. Sometimes it was impossible to elicit any bids at all when the grapes were very wasty, and for those which were fairly sound, sales were difficult at from 9s. to 14s. 6d. for the 1,750 cases offered immediately after landing, of which 1,100 cases were then sold, the bulk realizing from 9s. to 11s. Later sales, however, have varied in prices in accordance with the out-turn of previous purchases. The bulks have been found to be very irregular in condition, and hardly any cases have opened alike. Out of identical parcels as low as 4 lb. up to 17 lb. of grapes have been available after cleaning, although some of the cases have, no doubt, yielded more, and some have been rotten and yielded nothing. If the grapes cannot arrive sound, it is clear that the business will never be profitable. There are less buyers of defective fruit than ever owing to the high cost of labour to clean such grapes, even when prices are so unremunerative for the growers. With the exception of waste in these grapes, there is very

little fault to be found in them. They have been generally good in respect of quality, and show a decided improvement on those shipped last year, not only as regards size of berry and bunch, but also in regard to flavour. These good points, however, whilst being absolutely essential if the grapes are to become marketable at satisfactory prices are not sufficient alone unless the fruit arrives sound. In our opinion, if these grapes had arrived sound, they would have realized even at a conservative estimate from 13s. to 16s. per case up to 18s. to 20s. for the best. . . . .

The *Moldavia* grapes were much about the same as those per *Orama*. As there were only about 1,100 cases by this steamer, they were disposed of without being placed into cool store as quickly as possible after arrival, although all the cases did not land in time to permit us to sell right out in one day. Of course, whilst these grapes were being sold, those per *Orama* had to be deferred although sales of the latter were resumed as soon as the *Moldavia* had been cleared.

The experience of the last two seasons is most disheartening. The attitude of the growers is naturally one of deep disappointment. Some of them are hopeless concerning the future, and talk of grafting their Ohanez vines to other sorts.

A Sample Barrel of Spanish Grapes.

Inquiries were made in London through the Agent-General as to methods of packing, &c., followed by Spanish shippers, in the hopes that some light might be thrown on the causes of recent failures.

It was suggested that this information could best be obtained by purchasing a barrel of grapes from Almeria, on the London market, and re-shipping it to Melbourne, a course which was given effect to last October.

The grapes were not a selected lot specially packed for the experiment, but an ordinary barrel purchased in the usual way of trade. Concerning it Mr. White (Acting Trade Commissioner) wrote on 3rd November last:—

Messrs. Isaacs and Sons Limited inform me that the grapes are from the Ohanez district. They are not such good bunches as they would have wished, but they were of the opinion that you would like to see in Victoria the Ohanez fruit as received from that particular district. The bunches were rather on the small side, but they were the best that they had for sale yesterday.

The grapes were shipped from London by s.s. *Jervis Bay*, on 28th October They arrived in Melbourne on 11th December. Owing to an oversight, they were not landed, but over-carried to Sydney and Brisbane, whence they returned with the steamer on its return voyage, and were landed at Melbourne on 7th January, having thus been 71 days on board ship. Adding the time which must have elapsed between picking and landing in London, these grapes must have been quite three months off the vine.

The barrel was carried, by arrangement, in the ship's vegetable locker, where the temperature, on arrival in Melbourne, was 36 deg. F. The barrel was opened on 7th instant, when the grapes were found to be in very good order, only two bunches were faulty; about one-half of the berries of each of these were mouldy and compacted with the cork to form a solid mass from which, however, no juice was exuding. All the other bunches were, with the exception of an occasional damaged berry, perfectly sound. Such damaged berries were mainly discoloured; they were seldom mouldy, and did not exude juice such as would damage the sound fruit. The total wastage in the barrel would scarcely amount to 2 per cent., and could be easily trimmed out with scissors.

The grapes were somewhat variable in size of berry and in degree of ripeness; some were distinctly golden and even russet, whilst others were quite green. None of the berries showed any signs of wilting. An average sample (green and gold) was crushed, yielding juice of specific gravity, 1.090 or 11.9 Baume (T. 63 deg. F.), and an acidity of .45 per cent. (as tartaric).

The barrel was of light pine wood, length of stave (over all), 19¾ inches. The average internal measurements were:—Head to head, 17 inches; diameter at bung, 16½ inches; diameter at head, 15¼ inches; in other words, a capacity of slightly over 1½ bushel (3,427 cubic inches). Gross weight of full barrel, 65 lb.; weight of cork filler, 8½ lb.; weight of empty barrel, 12½ lb.; weight of grapes, 44 lb.

The cork filler was distinctly coarser than that generally used by our packers; it was clean, free from dust, quite light in colour, and free from any discoloured grains (see A, Fig. 2).

The grapes were packed in four distinct layers separated by layers of cork without any grapes. The layers of grapes were approximately 4 inches in thickness, and were compact masses of grapes; though the cork penetrated through the layer, it was less plentiful between the grapes than might be expected. Four layers of grapes, and five layers of cork a little over an inch in thickness (including top and bottom) completely filled the barrel. The layers of grapes seem to have been packed without any very definite arrangement of the bunches, though it was evidently done in such a way as to interpose a little cork between the outside bunches and the sides of the barrel; very few berries were in actual contact with the wood. The barrel was not lined with paper.

The bunches did not show very distinct evidence of the thinning out of the berries, which is said to be extensively practised at Almeria. This must take place at an early stage when the berries are quite small. Though most of the bunches were fairly loose a few were on the tight side. Most of the bunches had very long stalks (see Fig. 1). The largest bunches weighed about 1 lb., many weighed ½ lb., and some even less. Very few were shouldered in the manner characteristic of the Ohanez grape. Large bunches had evidently been subdivided by the removal of these shoulders.

A remarkable feature of these grapes when unpacked was the dryness of the stalks. These were almost completely lignified, though in a few cases the smaller ramifications and pedicels were still green. These stalks were in marked contrast to the grimy and more or less mouldy stalks, with cork adhering to them, which usually detract from the appearance of our grapes, after lengthy storage.

A point which may prove of considerable importance is the fact that the grapes had been sulphured (dusted with sulphur in powder) before being packed. Whether this had been done for oidium control before picking or if the sulphur was specially applied to promote keeping, is not quite clear, but the evidence of their having been sulphured was unmistakable.

A small case of the grapes from the barrel was re-packed in cork on the 11th January and taken to Mildura the following day. On the 13th when displayed at a meeting of the Merbein District Ohanez Growers' Association, these grapes opened up in exactly similar order to that when the barrel was first opened on the 7th January.

Some of the grapes were kept, free from cork, in the office at the ordinary temperature to test their keeping powers. A fortnight after

unpacking (21st January), little change had taken place, the grapes were still in excellent order. A week later (28th January) a certain amount of deterioration was noticeable, wilting had taken place to an appreciable extent, and a few berries were slightly discoloured.

A similar importation of Almeria grapes was made by the Department of Agriculture in 1909* when two consignments of Spanish grapes (two barrels in each consignment) were shipped from London by Peninsula and Oriental s.s. *Morea* and *Mooltan*, which reached Melbourne, respectively, at the beginning and at the end of January, 1909. One barrel, on each steamer, was conveyed in cool storage and the other

Fig. 1.—Ohanez Grapes from Almeria (Spain).

Part of contents of barrel unpacked 8th January, 1926. Note length of stalks. Bunches not trimmed in any way. The damaged berries are less numerous than appears in the photo. Removal of bloom in handling makes many sound berries appear faulty.

as ordinary cargo. These grapes opened up in much the same good order as the barrel recently landed. A striking feature was the slight difference between the quality of the fruit carried as ordinary cargo and that in the ship's cool chamber. In the two barrels shipped by the earlier boat this difference was trifling. In those on the later boat there was a distinct, though not considerable difference, in favour of the cool-stored fruit.

Almeria and Merbein Conditions Compared.

It is thus evident that the Spanish-grown Ohanez grapes carry rather better than ours. There is, however, no doubt whatever concerning the

* See *Journal*, 10th August, 1909.

identity of our Ohanez grape with that grown in Almeria. To what factors do the Spanish grapes owe their special keeping power?

In the opinion of the writer the answer to this question lies in the cultural conditions ruling at Almeria. Vines planted on deeply-worked land, and, therefore, provided with a deep root system which permits them to do with only moderate irrigation and a final watering about three months before the grapes are packed.

Almeria is situated in the hottest and driest part of Spain, at the south-east corner of the peninsula.

Complete data as to the climate are not available, but the following extracts concerning this and some other features of the Almeria vineyards are taken from a report compiled by the writer shortly after his visit to that interesting district in December, 1907.*

The warmth of the climate is evidenced by the fact that the neighbouring seaport of Motril, some 60 miles westward, and on about the same latitude, is the principal centre of sugar-cane culture in Spain. The Almeria vineyards are surrounded by barren, rocky hills, bereft of vegetation, barring a little Esparto grass.

The climate is warm and very dry—so dry that without irrigation the grape-shipping industry would be impossible. I was not able to ascertain the average annual rainfall, but it cannot be much over 12 inches. Last year (1907) only 10½ inches were registered, whilst a couple of years back it was only 8 inches. Long periods without rain are of frequent occurrence.

It has indeed been reported recently that periods of several years with practically no rain occasionally occur, notwithstanding which the vines continue to bear crops.

The soil is prepared for plantation by deep subsoiling or trenching.

The soil is a mellow loam varying a good deal. . . . A curious formation is met with in some of the vineyards where alternate bands of good friable loam are separated by comparatively thin horizontal layers of hard, water-deposited limestone. In some cases, by making a hole through the crust, where it occurred at a depth of about a foot, the vine was permitted to send its roots down into the good soil underneath. In other cases this hard layer was entirely removed by blasting, at considerable expense. . . . The soil, though of good mechanical texture, is not a very rich one. The best shipping grapes are said to be produced on the poorer soil.

The size of the vines, which are trained on *parrales*, or large overhead trellises completely covering the vineyard, bears testimony to deep preliminary preparation before the vines are planted. These large vines are planted usually at from 15 feet x 15 feet to 20 feet x 20 feet. Some of them have a girth of 19½ inches a foot above the ground.

As regards irrigation. The land is all most carefully graded into plots of various sizes according to its slope; each plot is surrounded by a small dam for irrigation, which is always applied by flooding. The water must be carefully applied, and especially not too near the ripening season, or the quality of the fruit, and more particularly its carrying quality, will suffer. Winter irrigation is largely practised. Care is taken that the subsoil gets a good soaking either from rain or irrigation. In a normal season one summer watering is given in the month of June (December in Australia). Should the season be an exceptionally dry one, two summer irrigations are given, one in early June and the second a month later. Large sums have been spent in providing storage basins for water. In some places dams have been made across blind gullies where water is caught and retained for summer use. . . . .

Cultivation is usually done by bullocks, the Roman plough being the implement used. . . . One deep winter cultivation is practically all the vines receive A light harrowing (scuffling is perhaps a more appropriate term) is given after irrigation. From 15th August to the vintage the soil is not touched. An idea seems to prevail that interference with it during this period would have a prejudicial effect on the quality of the fruit.

* See *Journal*, 10th September, 1908, p. 545.

Manure is applied but not in large quantities; over-manuring and over-cultivation are alike held to reduce quality. Though richer soils yield heavier crops it is poor, deep soils which produce the best grapes. . . . Disbudding is practised, most of the shoots without fruit being removed. Those bearing fruit are stopped back.* Cincturing, such as we know it, is not practised, though a form of it known as *capar las parrales* is sometimes practised. It consists in removing a narrow ring of bark on the shoot of the current year beyond the bunches . . . .

Such were the main points I was able to gather concerning the establishment of the vineyard, irrigation, and cultivation. My visit lasted only a day and a half—Almeria was not included in my itinerary. Had I know the developments the future had in store, a prolonged visit and more exhaustive inquiries would certainly have been justified.

From the above it is evident that conditions in Almeria and Merbein are, in some respects, at least, very different. Rainfall is similar in both places, though allowance must be made for the difference between the coastal atmosphere of Almeria and that of inland Victoria with its more active evaporation. The *parrales* also form a complete cover of verdure, shading the soil to an extent that does not obtain in our vineyards. Nevertheless there is a great difference between the rare waterings given in Almeria and the more frequent ones in Merbein, and especially in the date of the final watering—three months before the grapes are picked, in Almeria.†

The writer has for some years held that timing the irrigation of our vines after the Spanish method would be conducive to better keeping quality in the grapes. He has discussed the question at length with leading growers. It is no doubt easy to advise the withholding of water after a certain date—say early January—but there are practical difficulties in the way. With us, a heat wave may force the growers' hand. Signals of distress in the shape of flagging foliage, &c., may render the application of water imperative. Though grapes from vines, not recently irrigated, carry best, the wilting point must not be approached else keeping quality will be even worse than in the case of recently watered vines.

Some of our best growers who have tried dispensing with later irrigations are emphatic that not only were their grapes not improved thereby, but that they actually kept less well than those watered in the usual way.

Our vines, planted on land which was not previously subsoiled, have not the deep root system of the Spanish vines. They are, therefore, less well fitted to stand a lengthy period at the hottest time of year, without a watering. To enable the vines to dispense with watering after early January this objective must be kept in view when first establishing the vineyard, and all means must be taken to promote a deep-root system, such as planting on deeply subsoiled land and ploughing deeply each winter to force the roots to develop well away from the surface layers. Much can be done in the way of subsoiling already established vineyards. Both here and in Europe old vineyards have been thus rejuvenated and provided with a new and better constituted root system. Its application in our Ohanez vineyards should permit dispensing with the objectionable later waterings, though it must be remembered that some time must necessarily elapse before the full benefit is obtained.

* Doubtless to promote the development of lateral canes. At the time of my visit I was unaware of the importance of these in connexion with the fruiting of the Ohanez.

† The evil effects of tardy watering must largely depend on the subsequent weather conditions. Late irrigation, followed by a showery or even a cool autumn, may seriously impair keeping quality; in a warm dry autumn it would have little or no injurious effect.

West Australian Grape Shipments.

Western Australia obtained a good start over the other Australian States in the matter of grape shipments. The name of the late G. Barrett-Lennard is well known throughout the Commonwealth as the pioneer of the industry—St. Leonard's, the important vineyard founded by him at Guildford, near Perth, still contributes the bulk of Westralian grape exports. These have been regularly shipped to London and the East for many years past. In 1920, shipments from Fremantle aggregated 8,277 cases, of which 2,882 went to London and the balance to Eastern ports—mainly to Sourabaya, which took no less than 4,459 cases. This was only an ordinary season; in some years these figures have been considerably exceeded.

It is noteworthy that St. Leonard's is not now irrigated. A plant was installed some years ago at considerable expense, but it is not now used, as it was found to impair the keeping quality of the grapes. Guildford, with a 32-in. rainfall is, of course, very differently situated from Merbein, with about 11 inches (Mildura average of 35 years), where the vine could not be profitably grown without irrigation. By timing the watering, however, to assimilate to Guildford conditions, the carrying quality of our grapes would be improved. It must be admitted that West Australian grapes carry rather better than ours. Last season, when our grapes averaged less than 10s. per case, those from St. Leonard's averaged £1 in London. On similar lines is the superior keeping quality of Ohanez from Rutherglen (*see* next paragraph).

Experiments at Government Cool Stores.

These have been continued each season since 1909, tests being made with various table grapes to gauge their keeping quality. Since 1913, when Ohanez were first available in quantity, grapes of this sort have been displayed, each September, at the Royal Agricultural Society's Spring Show. At Show time these grapes have been off the vine for six months, packed with cork filler and cool stored. In most years these Ohanez grapes open up in excellent order; in the worst seasons it has been possible to make a creditable display, after some trimming of the bunches with scissors.

An outstanding feature is the marked superiority of the Ohanez as a "keeper" over all other grapes. Some other sorts keep fairly well; well enough, perhaps, to permit of profitable export. They are erratic, however, and it would be wise to defer shipments with them on a commercial scale, until Ohanez exports are on a more satisfactory footing. Among other sorts which keep well are Emperor, Black and Red Malaga,* St. Jeannet, and Purple Cornichon, but they are all far behind Ohanez. Purple Cornichon has weak stalks and a tendency to drop its berries; this, however, without loss of juice. Valensy and Flame Tokay have opened up fairly well in some seasons; they keep slightly better than Waltham Cross (Rosaki). It is to be regretted that none of the Muscats store satisfactorily. Gordo Blanco is a very poor keeper. The skin weakens and breaks around the insertion of the pedicel, allowing juice to escape and soil the sound berries. It is curious that, after

* The correct names of these sorts have not yet been ascertained; the names Black Malaga and Red Malaga by which they are known here are certainly incorrect. Malaga is not the name of a grape but of a Spanish town and districtwhere many distinct vine sorts are grown.

being in cool store for a few weeks, Muscat grapes lose nearly all their characteristic flavour.

Ohanez grapes from the Rutherglen Viticultural Station, where irrigation is not practised, have, each year kept distinctly better than grapes of the same variety from the irrigation settlements. The difference has been noticeable each year, though in some seasons it is more pronounced than in others. The rainfall at Rutherglen Viticultural Station is 21.2 inches (average of nine years), or considerably less than that of Guildford (W.A.).

Other points which have been noted are the superiority of rather coarse cork filler over that with finer particles and the advantage of earlier picking (*see* below).

Mr. Harrison's Experiments.

During the past two seasons cool storage experiments have been under the control of Mr. J. E. Harrison, B.Ag.Sc., Science Field Officer. To this gentleman I am indebted for the following note dealing with the main difficulties to be overcome:—

"During the last two years, supplies of grapes for experimental cool storage have been obtained from Mildura and Rutherglen, with the object of discovering as far as possible those conditions of the vineyard and the cool store which prolong the life of the grape in storage. Several varieties of grapes have been used, but special attention has been paid to the Ohanez, which alone has promised good results in long storage. This variety has been selected from various soils, from light and heavy crops, and from lightly and heavily irrigated portions of the same vineyard, and the selections have been stored for comparison. Various lots have also been stored at temperatures of 32° F., 34° F., and 37° F., and the results compared.

In all instances, the factor which has limited the life of this and other grapes in storage has been mould development, and the various recommendations which we are now able to make aim at preventing or limiting mould.

Commencing in the vineyard, the first precaution should be the removal and burial of all grapes lying about neglected or forgotten. If moulds should attack these, countless millions of spores develop and are blown about the vineyard. Burial is the surest means of preventing this.

In all harvesting operations only clean boxes and cases should be used. Second hand receptacles of any kind should be scalded and scrubbed before use.

No mouldy grapes or old cases should be left lying in the packing house. Spores are blown like dust into the atmosphere from all mouldy fruits, food scraps, and other infected substances. In particular, great care should be taken to avoid wet or damp areas or objects in and around the packing shed.

Under no circumstances should granulated cork at all damp or having a mouldy smell be used in packing.

Growers will understand that once the fruit is packed in cork dust, the possibility of mould spores gaining entrance into the case and attacking the fruit is remote. It is the mould spores within the case which are the source of danger, and the above recommendations aim at limiting the number of these spores.

In regard to the condition of the grapes chosen for storage, only those should be selected which the grower is convinced are sound, robust, and likely to keep. The main stalks should be dry, the fruit ripe but hard and firm, the bunches loose and open. Great care should be taken to avoid dense bunches, in which the berries are studded closely together. Bunches containing soft, tender berries are also undesirable, firm ripe berries, green in colour, keeping better than soft golden berries.

As far as soil itself is concerned, no definite result has been obtained as to any difference in keeping quality in grapes from different soils. Rutherglen has provided rather better grapes for storage than Mildura; it is thought perhaps because of the practice of irrigation at the latter place.

It is wise to store the grapes as soon as possible after packing.

Thirty-two degrees Fahrenheit is recommended as the best temperature for storage. This allows a good margin before the freezing point of the fruit is reached, which in an average sample probably lies between 26° and 27° F. Mould development has been found to be considerably less at this than at higher temperatures.

It is emphasized again, and it should never be lost sight of, that so far it has been mould attacks alone which have limited the life of the grape in storage."

Maturity of Grapes.

Concerning the best moment to gather the fruit the evidence is sometimes contradictory. Unlike many other fruits, grapes ripen but little after they are picked; they should not, therefore, be gathered before they are almost ripe. In the barrel of Spanish grapes recently imported the ripeness of the fruit varied a good deal, and yet there was no appreciable difference in soundness between the green and the golden berries. In our cool storage experiments in the few cases where comparison was possible, grapes cool stored fairly early kept better than those sent in a week or two later. This is possibly due to the earlier picked grapes missing adverse weather conditions to which those picked later were exposed, rather than to better keeping quality of the less ripe grapes. To pick on the green side is, however, unwise. According to Messrs. Swann and Company—*

> We expect you know that grapes on the green side or greenish, do not meet with such favour from the actual consumers as those which show the pale yellow colour, you will see from our report that the prices have been 3s. to 5s. less when the grapes have been more or less green . . ."

Stripping a few of the basal leaves, a week or so before picking, should promote the development of a yellow colour and improve the keeping quality of the grapes. Such work must be judiciously performed, only old leaves, which have ceased to be of use, being removed, else the following season's crop will suffer.

The Cork Filler.

For lengthy storage grapes must be packed with a filler. Granulated cork is the most suitable substance. Though often spoken of as "cork dust," this term is incorrect as the cork grains are of fair size; they must be free from dust, which would adhere to the fruit and spoil

* Letter of 31st May, 1923.

Fig. 2.—Cork Fillers.

A. Filler from barrel of grapes recently imported from Spain. B, C, D. Samples of cork obtained from a Melbourne firm. E. Sample of cork known as No. 10 grade. F. Sample of cork described as 2¼. (Samples E and F were obtained from another Melbourne firm.

its appearance. The size of the grains varies considerably, as will be seen from Fig. 2, which is a photograph (actual size) of several grades of cork. At A is shown the filler from the barrel recently imported from Spain. B. C. and D. are samples supplied by a Melbourne firm, and classed respectively as "coarse," "medium," and "fine." It will be noted that C is much the same gauge as A. The other two are samples from other Melbourne firms; E is described as No. 10 grade, and F as $2\frac{1}{4}$. The numbers used in the trade, to indicate the grade, are not standardized in any way, and a good deal of confusion seems to exist. In the 1925 shipments a grade known as No. 7 was mainly used; this was much the same size as F, Fig. 2, though this last is described as $2\frac{1}{4}$ by the firm that supplies it.

The experience of the past few years goes to prove that fairly coarse filler preserves the grapes better than a finer grade—with the latter there is more tendency to mould. D, E and F (Fig. 2) are rather too fine. In the recently imported grapes the coarseness of the cork (A, Fig. 2) surprised many—the reason for the superiority of rather coarse cork is not clear. It cannot be owing to better ventilation, since it is generally recognized that the more airtight the package the better the grapes keep. (*See* next paragraph).

Good quality cork is essential, as the filler may be a fruitful source of mould contamination—it should be fresh, sound, and free from any stale or musty smell. That made from old bottle corks or cork refuse should, on no account, be used. At St. Leonard's (W.A.) great importance is attached to the washing of the cork, which is carefully carried out, it being subsequently dried in the sun on cement floors. Antiseptic treatment would seem desirable, but subsequent drying is difficult if a liquid disinfectant is used. Experiments carried out last season by Mr. Harrison with copper sulphate solution and copper carbonate dusted into the cork, gave negative results. Disinfection by superheated steam, sulphur di-oxide or formaldehyde might give better results. It is, in fact, possible that sulphur di-oxide is thus used in Spain. Fancying that the filler, in the recently imported barrel, smelt faintly of SO_2, the writer submitted a sample for analysis. A trace of sulphur di-oxide was, indeed, found; a result consistent with the idea that the cork was fumigated with burning sulphur before packing. In such a case nearly all the SO_2 would be lost during unpacking and handling. There is nothing in the cork to hold appreciable quantities of the gas.

Brief mention only can be made here of the Redwood sawdust filler largely used in California, which is said to give excellent results. It is, in fact, claimed to be superior to cork, though this is hard to credit. In an experiment on a small scale, conducted here in 1921, this filler was fairly satisfactory though it did not prove equal to cork. Sawdust is scarcely an appropriate term for this material, since it is very different from ordinary sawdust. It consists of fair sized grains, dust and splinters being graded out. It is specially cut for the purpose with a large-toothed saw.

The Container.

Grapes may be shipped in cases, barrels, or drums—Almeria grapes are exclusively shipped in barrels. These are made of light wood and, though not so impervious as wine casks, they are close fitting and allow very little air to pass. Exclusion of air, indeed, seems essential to

satisfactory keeping. It is reported that, some years back, induced by considerations of cheapness, Almeria growers essayed the substitution of cases for barrels: the grapes did not keep so well, and the older style of package was retained. It is curious that this should be so with grapes, as ventilation is considered essential in cold storing most other fruits; "brown-heart" in apples is attributed to an excess of carbon-dioxide in the atmosphere in which the fruit is stored. Inside the Almeria barrels the atmosphere must contain a good deal of CO_2 resulting from the respiration of the grapes.*

On the other hand, Mr. Harrison found that grapes kept in glass jars with ground stoppers, developed a pronounced and unpleasant acidity, though maintaining their appearance.

It would appear that the more air-tight the barrel the better do the grapes keep. The best Almeria grapes are packed in oak barrels, which are more impervious than those of pine such as are used for cheaper grapes.

Another advantage of the barrel is that it ensures air circulation in the ship's hold. Though ventilation inside the package is not only unnecessary but undesirable, air circulation around it is essential to temperature control. In the case of a compact stack of cases, the inside ones may heat; without cold air circulation to remove the heat thus generated, injury to the fruit is inevitable.

The price of barrels being prohibitive in Australia, owing to high cost of cooperage, our shipments have hitherto been made in cases—various sizes have been tried, the most popular one to-day being the three-quarter bushel grape case; internal dimension 24″ long x 6″ wide x 11¾″ deep, with a partition. Contents, 1,692 cubic inches. In the opinion of several persons qualified to advise, this case is too flat and too shallow—grapes do not pack well in it, and careless handling exposes it to be banged down on the floor to the injury of the fruit inside. In their opinion a more suitable case would be the bushel case 20″ long x 10″ deep x 11⅛″ wide (cubic contents 2,225 cubic inches).†

This case would need to be specially made for grape packing with very tight fitting boards so as to approximate more nearly to the Almeria barrel.

In California, grapes shipped to other parts of the United States of America in Redwood sawdust filler, are packed in drums made of thin veneer, lined with stout strawboard. If obtainable at a cheap price, something similar might with advantage be substituted for cases which do not seem to be an ideal package for grapes.

Packing.

Whether to pick a day or so before packing, to permit slight wilting, or to pack immediately, is open to question. Comparative experiments last season showed no difference. The former course is sometimes more convenient and it seems to present no drawbacks.

Considerable importance attaches to the relative proportions of cork filler and grapes. In several letters from the Victorian Trade Commissioner in London comment has been made on the insufficient proportion

* This recalls the Californian proposal to ship grapes from San Francisco to New York, in ship's holds saturated with CO_2 until the oxygen content was reduced to 1 per cent. Much was expected of this method towards the close of 1922, but little has been heard of it since.

† The imperial bushel contains 2,219·7 cubic inches.

of filler; for example (30th July, 1925) describing the grapes *ex* s.s. *Moldavia*, he said—

> The boxes were strong and well made. In many cases, however, it would have been better to have had more granulated cork and less grapes to the case as in the handling some of the cork had evidently worked away and the bunches got damaged against the sides or tops of cases.

Our three-quarter bushel base is supposed to hold 28 lb. grapes and 5 lb. cork. If the full quantity of grapes is put in, it is difficult to pack in the 5 lb. cork, and many cases have been packed with less. Fearing loss of weight in transit some growers have packed up to 29 lb. of grapes to the case. This means less than 4 lb. cork, an undesirably small proportion.

In the Spanish barrels the proportion of cork varies somewhat,* but it does not seem to be below 1 lb. cork to 5½ of grapes—on the average it is probably 1 to 5—or rather more than is used in our cases.

A chance occurrence at the cool stores last year shows the beneficial influence of a higher proportion of cork. A half case of Ohanez, not packed for export, but with considerably less than 14 lb. grapes and more cork in proportion, was inadvertently left in cool storage until 13th December. When inspected after nearly nine months' storage the grapes were in very fair order—much better than grapes from the same vineyard packed as for export and inspected at Show time (September). The influence of the more abundant cork was striking. One pound of cork to 5 lb. of grapes would seem to be the most desirable proportion. Though this may perhaps be reduced to 1 to 5½ without marked ill effects, it is safer to use too much rather than too little cork.

Temperature.

Opinions vary much concerning the best temperature to store at. In all our cool store experiments, at different temperatures, it was invariably found that the nearer the temperature to 32° F. the better the grapes kept. Moulds are much less in evidence in grapes stored at the lower temperature. And yet the shipping firms are emphatic that 38° or even 40° is the best temperature for shipment of grapes. They admit the good preservation at lower temperatures, but hold that such grapes deteriorate more rapidly on removal from cool store. Writing on 31st May, 1923, Messrs. Swann and Company say—

> In our opinion 32 to 32½ is too cold for grapes. We have found in past years that if grapes are too chilled they lose all flavour . . . . and secondly, they deteriorate much more quickly on removal from cool chamber. They may turn soft and begin to sweat within 24 hours. A week may easily elapse between landing of the grapes and going into consumption, and, therefore, it is most important that keeping qualities should not be affected.

and in a further letter (1st June, 1923)—

> Our views as to temperature are confirmed by a buyer of some of our grapes. He told us to-day that the grapes he bought have deteriorated very quickly, so quickly in fact, that two casks had gone bad before he could dispose of them. He put this down entirely to their having been well nigh frozen instead of merely kept cool. Spanish Almerias will keep for six months or more at ordinary temperatures, say 40° to 50°.

---

* Recent importation, cork 8¼ lb., grapes 44 lb. = 1 to 5·2
1909 importation, cork 8¾ lb., grapes 40 lb. = 1 to 4·5
Recent advice from London, cork 8 lb., grapes 44 lb. = 5·5

Fumigation with Sulphur Di-oxide.

Brief mention may here be made of a recent development in California where the "keeping period" of juice grapes has been considerably prolonged by fumigation with SO_2 produced by burning sulphur. Treatment on similar lines might, perhaps, be applied to export grapes. The following extracts* will give some idea of the method:—

The SO_2 was applied to the grapes in the form of the fumes of burning sulphur which was produced in a specially constructed store provided with a forced draft . . . .

The outstanding facts brought out by the experiments are (1) That uniformity of distribution of SO_2 can be obtained when grapes are treated in air-tight rooms in which the arrangement of the boxes is similar to that of a loaded car, and (2) that grapes uniformly treated with the proper amount of SO_2 as a dry gas may be expected to keep at least twice as long as the untreated checks when held under the same conditions of storage. . . . .

A uniform distribution of a suitable concentration of SO_2 without injury to quality may be obtained in grapes arranged as in loaded cars, when the following requirements are met:—(*a*) A sufficient SO_2 supply and air flow to displace the air in the car with a uniform SO_2 air mixture within two or three minutes, (*b*) the SO_2 air mixture must be cool before being driven into the car, and (*c*) the equipment must be capable of maintaining this flow of SO_2 in air for from 10 to 30 minutes according to the concentration of the mixture used.

It was found that with a 2 or 3 per cent. SO_2 concentration in the air, about twenty minutes was required to cause sound grapes to absorb 50 to 100 mgs. per kilo. With a 4 to 6 per cent. SO_2 concentration in the air the time required was about ten minutes.

It was found that 50 mgs. of SO_2 per kilo of grapes is sufficient approximately to double the keeping period and that 100 mgs. does not injure the colour. texture and flavour of the grapes.

It was found impossible to treat grapes successfully by burning the sulphur inside the closed room or car.

The results obtained from an experimental car-lot shipment of grapes by Mr. J. H. Wheeler indicate that the results obtained in these experiments may be applied to commercial practice.

The grapes were packed in lug boxes (without filler), they were not lidded, and were readily penetrated by the air charged with SO_2. Shipping grapes in practically air-tight packages could not be similarly treated. They would need to be fumigated before packing. Possibly it would be sufficient to heavily fumigate the cork filler. If this were done immediately before packing it should retain sufficient SO_2 to effect the desired result.

Conclusion.

The disappointing results of the 1924 and 1925 grape shipments are much to be regretted. The confidence of growers has been shattered, when success was nearly achieved. The industry has received a set back from which it may take years to recover.

And yet there seems no real reason why we should not be able to land our grapes in sound condition at the antipodes just as successfully as Almeria growers. Our dry inland atmosphere should give us advantages in the shape of a tougher skin and greater freedom from moulds. But—and it is a big but—we must arrange the water supply of the vine. and the times at which it is applied, on similar lines to those obtaining in Spain.

* *Hilgardia*, June, 1925.—"The Utilization of Sulphur Di-oxide in the Marketing of Grapes," by A. J. Winkler and H. E. Jacobs.

In some seasons our Ohanez grapes have carried admirably. These shipments have demonstrated that the right sort of grapes, properly grown and properly packed will carry almost as well as apples. They are not liable to bitter bit or brown-heart. They are, however, susceptible to moulds. Avoidance of these troublesome fungi, especially in a season of abnormal summer rainfall, is the main problem awaiting solution.

"BRAXY" IN SHEEP.

PREVENTIVE VACCINATION.

Note by Professor Woodruff, University Veterinary School.

This disease is prevalent in several parts of Australia, and is frequently found to occur in summer, particularly after a dry season. The Veterinary Research Institute, Melbourne University, has for some time been engaged on an investigation of this and similar diseases, and sheep-breeders and graziers are notified that this Institute is prepared to vaccinate a limited number of sheep against the above disease on properties on which it occurs.

How to Recognize Braxy.

Sheep that die of Braxy rarely show any symptoms. They may be apparently quite well, may struggle for a few minutes after going down, and half an hour later may be dead. They often die through the night. If a Braxy sheep is opened up immediately it dies, one will be surprised by the few signs of disease. If, however, a number of cases be examined, careful search will show that on or in the liver, which is usually somewhat darker than normal, are a few irregular, dirty-white or yellowish, dry areas up to about an inch in diameter. If such an area is cut through, it will be seen to extend into the liver substance for about half an inch. It is in those whitish, dead parts of the liver that the germ responsible for the disease is found. The other sign of Braxy is found in the chest cavity. When this is carefully opened, so that the knife does not touch the heart, it is noticed that the thin bag which surrounds the heart, and which is called the pericardium, is full of clear straw-coloured fluid or jelly-like material.

When a sheep affected with Braxy dies, putrefaction sets in very quickly, in fact, this "going bad" very shortly after death is one characteristic of the disease. Thus, it is almost impossible to detect the typical signs of the disease described above or to discover the real cause of death in an animal found dead. It must be emphasized that only sheep which have been seen to die and which are opened and examined immediately after death will provide satisfactory evidence that Braxy was present. Farmers who suspect that they are losing sheep through Braxy or Black Disease and are desirous of using a vaccine should communicate at once with the Director, University Veterinary School, Parkville, Victoria.

THE POULTRY INDUSTRY.

An Appreciation of Departmental Assistance.

Hereunder is a copy of a letter recently received by the Director of Agriculture (Dr. S. S. Cameron) from a country poultry farmer:—

As one who has derived considerable benefit from the various branches of your Department, and more particularly the poultry section, I feel it incumbent upon me to write a few lines in appreciation of the advice and help so frequently sought by me and so promptly given by your staff.

In 1921, having a limited amount of cash, I leased a small property here with the idea of making a living from poultry, and battled along under adverse circumstances, as I had not the laying strain of birds as represented to me when I purchased them from a private breeder in 1923. In sheer desperation I got in touch with your Department, and after inspection was advised to dispose of the whole of my birds. I acted upon the advice, and later purchased 300 eggs from the Werribee Research Farm, from which I got good results.

I may here say that I never realized that I had such a poor quality of "stuff" previously. After the pullets from the eggs obtained from Werribee began to lay, and from then onwards, I felt that after all I might make good with poultry. In September of the present year, with the help of a careful wife, we had saved enough for a small deposit on a small farm of 10 acres, and hope for a successful future.

According to press reports some time back strong opposition was brought forward by outside breeders against the departmental policy of disposing of eggs and birds, and as one who was saved from ruin—and I use the word with a full realization of its meaning—in the industry, I sincerely trust that that policy will be adhered to in order that it might help others as it has helped me.

In advising you of the progress I have made, I feel it due to your Department to say that at all times it has been ready and willing to give me advice and help, and any success I may have attained is due to its guidance, coupled with my own individual efforts. You perhaps, sir, may think I have gone rather much into detail, but my object in doing so was to show the amount of good your Department is doing for the man on the land.

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WINTER FODDER CROPS

Somner's Special Mixtures

No. 1—Rye, Dun Peas, Golden Tares (Vetches), Barley or White Oats, mixed quantity, sufficient for 1 acre - - - - - - **15/6**

(Five-acre lots, **14/6** per acre).

No. 2—Oats, Cape Barley, Golden Tares, Tick or Horse Beans, Partridge, Dun, or Blue Peas, mixed quantity, sufficient for 1 acre - - **18/6**

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Either of these mixtures, if cut or pastured in Winter and ploughed under in August, will make a good preparation for Lucerne to be sown in August or September.

The growing of Summer Fodder Crops imposes a tax on the resources of the soil, and as a restorative when ploughed in, the above mixtures are specially recommended. The crop comes away rapidly and makes steady headway during Winter, giving a good quantity of excellent fodder.

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English Grown (true) 8d. lb.; 65/4 cwt.
N.Z. Grown, 7d. lb.; 60/- cwt.
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Valuable for its green or dried fodder, and as a Winter Soiling Crop for Orchards, Vineyards, &c., on irrigated land. At least four cuttings can be made during a season. Sow 8 to 12 lb. per acre in drills, or 20 to 30 lb. broadcast.

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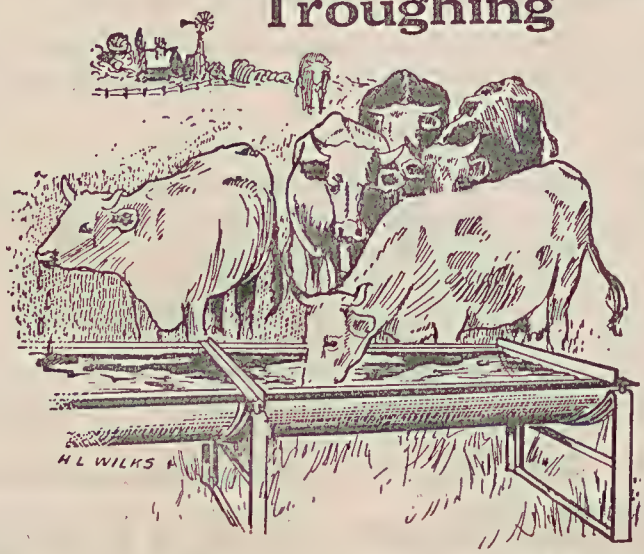

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DEPARTMENT OF AGRICULTURE, VICTORIA

Red Poll Dairy Herd

The Department has now completed the orders for calves that were booked ahead of calving when the advertisement was withdrawn; consequently the booking of orders for bull calves from the forthcoming calvings has now been resumed.

BULL CALVES are sold for delivery at a month old at prices based approximately on the actual milk and butter fat record of the dam at the rate of 1s. per lb. of butter ***fat*** yielded. Thus a calf from a cow with a 400 lb. butter fat record is sold for 20 guineas, one from a 300 lb. butter fat cow for 15 guineas, and so on. Bull Calves *ex* heifers on their first calf are sold for a set price of 10 guineas.

(For Record of Yields of dams see Red Poll Herd Book.)

SIRES IN USE:

VICTORIA VOLCANO (322 A.)

Sire: Nicotine (69 A.A.) by Acton Dewstone (imp.) 9524 (4 A.A.).
Dam: Tonga (253 A.) by Honingham Archbishop (imp.) 9702 (48 A.A.).

Tonga's butter fat yields for 6 successive lactation periods are as follow:—1916, 341 lb.; 1917, 398 lb.; 1918, 419 lb.; 1919, 479 lb.; 1920, 428 lb.; 1921, 562 lb.

BELLIGERENT (Imported) 11096 (8 A.A.)

Dam's Record (1st milking) 7144 lb. milk.

Dam's Dam's	,,	14533 lb. milk	...	4	years	average	12871 lb.	milk.
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G.G.G. Sire's D. Dam's	,,	10088	,,	... 2	,,	,,	9754	,,

BIT O' 'BACCA (Vol. 3)

Sire: Nicotine (69 A.A.) by Acton Dewstone (imp.) 9524 (4 A.A.).
Dam: Nictitana (311 B.) by Nicotine (69 A.A.).

Nictitana's butter fat records for 6 successive lactation periods are as follow:—1918, 450 lb.; 1919, 396 lb.; 1920, 393 lb.; 1921, 465 lb.; 1922, 524 lb.; 1923, 536 lb.

Inspection of the Herd is Invited.

Visitors will be met at the Station on notifying the Manager, State Research Farm, Werribee.

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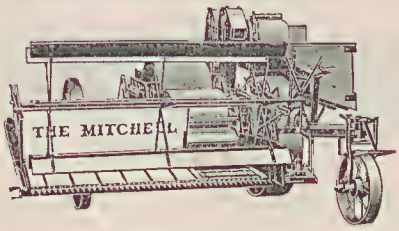

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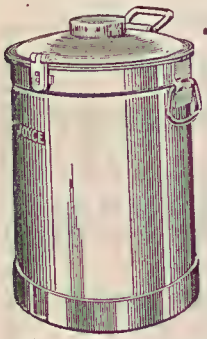

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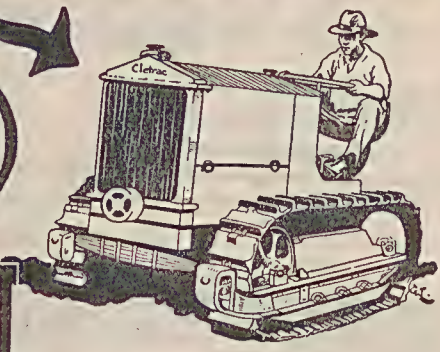

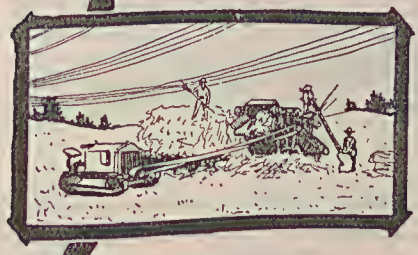

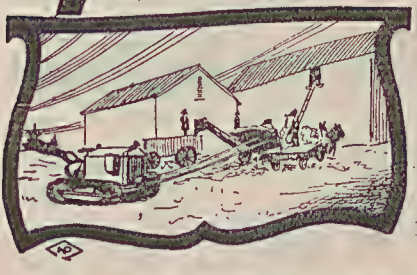

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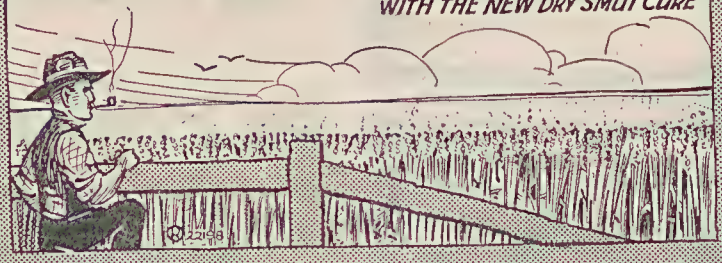

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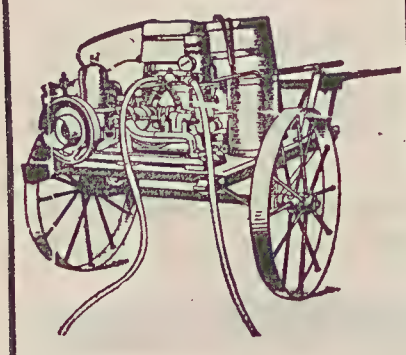

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DEPARTMENT OF AGRICULTURE

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DEPARTMENT OF AGRICULTURE

GOVERNMENT COOL STORES

VICTORIA DOCK

The Stores have a capacity of **743,980 cubic feet insulated,** and are capable of holding **372,000 boxes of butter,** or **248,000 cases of fruit, or 335,000 carcasses of lamb and mutton.**

Electric motor power totals 900 H.P.

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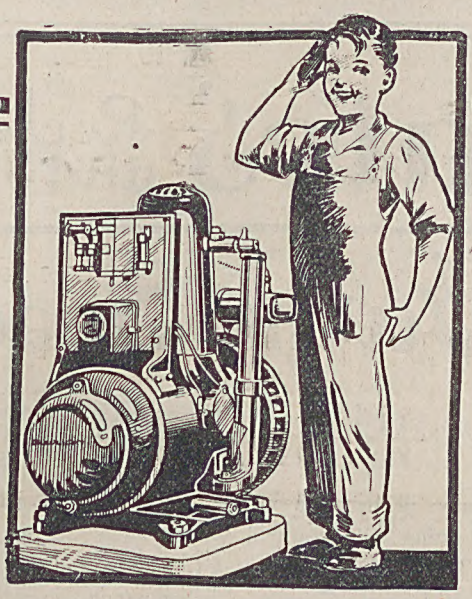
Expert Officers are connected with every Branch, so that any one requiring information regarding the production, preparation, and shipment of produce can rely upon being promptly supplied with up-to-date information upon all matters.



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THE autumn planting season for Fodder, Hay and Grain Crops, is now starting, and you will already have the preparation of your land well in hand. On the Coast, Highlands, and Western Slopes the laying down of Pasture Grasses is becoming increasingly important and is rapidly being recognized as an essential factor in the Farm Policy.

The capabilities and possibilities of Subterranean Clover are now well known, and we are anticipating a heavy demand this autumn, so would advise you to order early; it should undoubtedly be included in all pasture mixtures.

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Yates' Current Price List of all Farm Seeds is now available. It will assist you in making out your Seed Order.

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DEPARTMENT OF AGRICULTURE

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(Wheat and Barley)

FROM STATE FARMS, 1926

Select bred graded Seed—Wheat from the State Farm, Rutherglen, and Barley from the State Research Farm, Werribee, as under, will this year be available for distribution :—

From State Research Farm, Werribee—

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"Pryor" (malting barley) .. **6s. 6d. per bushel** on rails Werribee

From State Farm, Rutherglen—

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"Federation" .. .. **8s. per bushel** on rails Rutherglen

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On completion of grading, applicants will be advised as to the quantities allotted them, and in the event of any variety of seed being over-applied for allocation will be made on a pro rata basis.

All applications to be addressed to—

DIRECTOR OF AGRICULTURE, PUBLIC OFFICES, MELBOURNE

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